GSP Coordinating Committee

Coordinating Committee Meeting – July 23, 2018

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA-1

Image courtesy: Veronica Adrover/UC Merced

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Agenda

1. Call to Order
2. Approval of Minutes for June 25, 2018
3. Stakeholder Committee Update
4. Presentation by Woodard & Curran on GSP Development
    a) Plan Area and Authority – review comments received and discuss
    b) Minimum Thresholds
    c) Hydrogeologic conceptual model (HCM)
    d) Current conditions baseline, projected water budget, and sustainable yield

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Agenda

5. Public Outreach Update
    1. Plans for upcoming August 2 Public Meeting
    2. DAC Outreach
6. Coordination with Neighboring Basins
7. Update DWR's SGMA Technical Support Services (TSS) opportunity
8. Public Comment
9. Next Steps and Adjourn

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Approval of Minutes

Stakeholder Committee Update

Image courtesy: Veronica Adrover/UC Merced

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Plan Area and Authority

Image courtesy: Veronica Adrover/UC Merced

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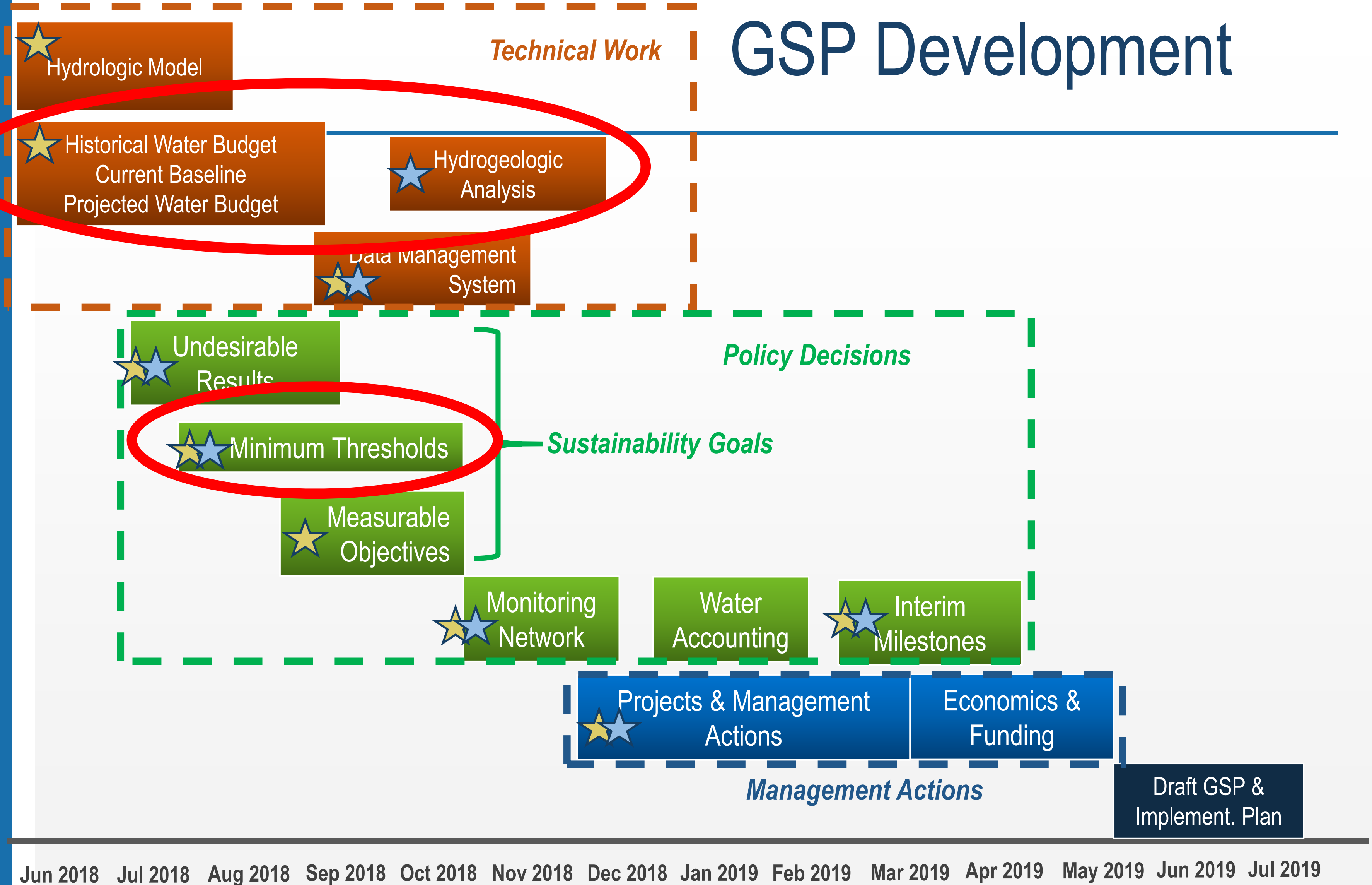
Plan Area and Authority

- Review of comments received

Minimum Thresholds

Image courtesy: Veronica Adrover/UC Merced

GSP Development



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Minimum Thresholds Need to be Developed for All Six Sustainability Indicators

- Chronic Lowering of Groundwater Levels
- ~~Reduction in Groundwater Storage~~
- ~~Seawater Intrusion~~
- Degraded Water Quality
- Land Subsidence
- Depletion of Interconnected Surface Water

Storage addressed by bringing budget into balance

Salinity Addressed Under Water Quality

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Minimum Thresholds Should Be Set Where Undesirable Results Would Occur

- Undesirable Results are ***significant and unreasonable*** negative impacts that can occur for each Sustainability Indicator
  - Example: Lowest GW elevations can go at a monitoring point without something significant and unreasonable happening to groundwater
- Used to guide and justify GSP components
  - Monitoring Network
  - Minimum Threshold
  - Projects and Management Actions
- If issues are already occurring, we only need to “go back” to Jan 1, 2015 conditions; if no issues are occurring, can set threshold where they would be anticipated to occur

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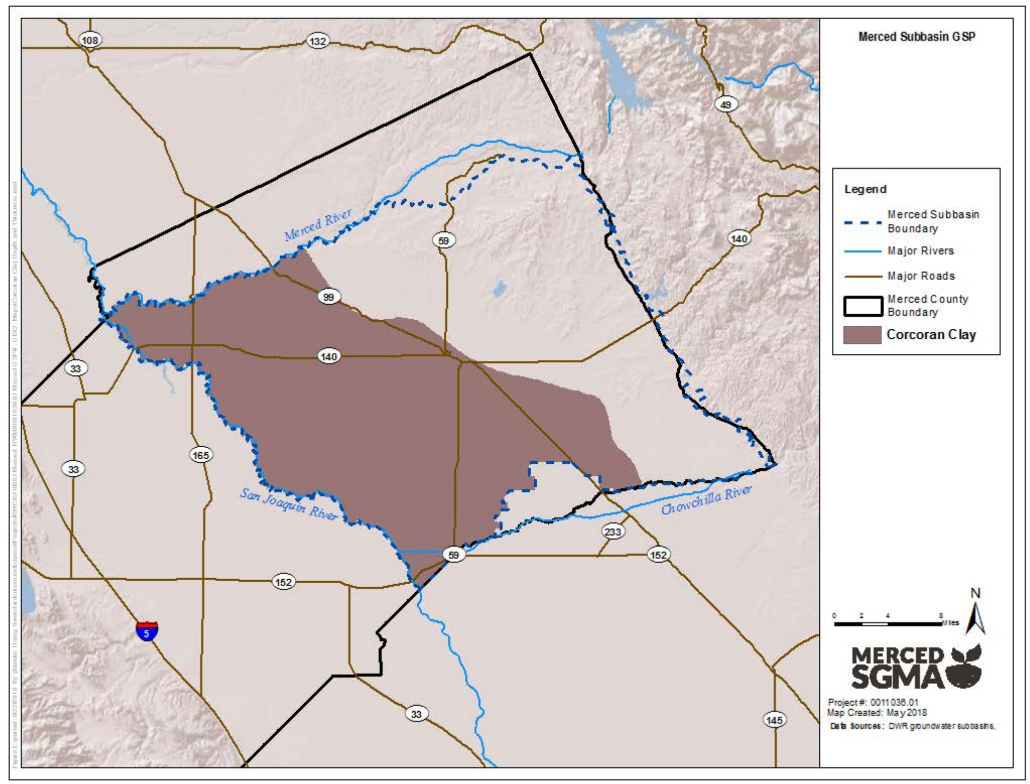
Minimum Thresholds – Approach
Datasets to Identify Minimum Thresholds

- Historical Low Groundwater Elevations
  - Have we seen URs at past low groundwater levels?
  - If no historical indication of URs, then thresholds can be at this level or deeper
  - If indication of URs, thresholds can be set above that historical level or at 1/1/2015 levels
- Domestic well depths
  - Typically the shallowest wells, first impacted from declining groundwater elevations
  - Absent known historical URs, domestic well depth can define the minimum threshold
    - Minimum depth
    - Defined percentile

Minimum Thresholds – Approach
Analysis based on Corcoran Clay

- Thresholds defined for 3 areas, based on Corcoran Clay
  - Outside
  - Above
  - Below
- Analysis performed separately for each



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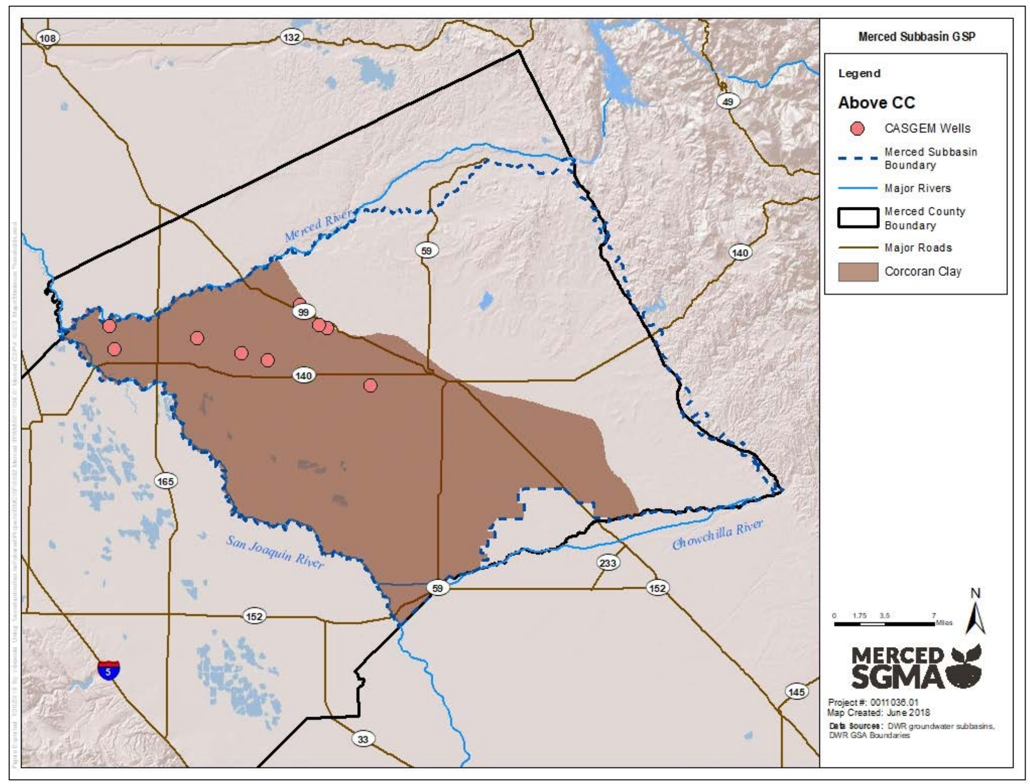
Minimum Thresholds – Approach Representative Monitoring Sites

- Previous meeting focused on basinwide understanding of data
- Thresholds are required at each monitoring location
- CASGEM wells are a starting point for representative monitoring
  - **Above Corcoran**
  - Below Corcoran
  - Outside Corcoran



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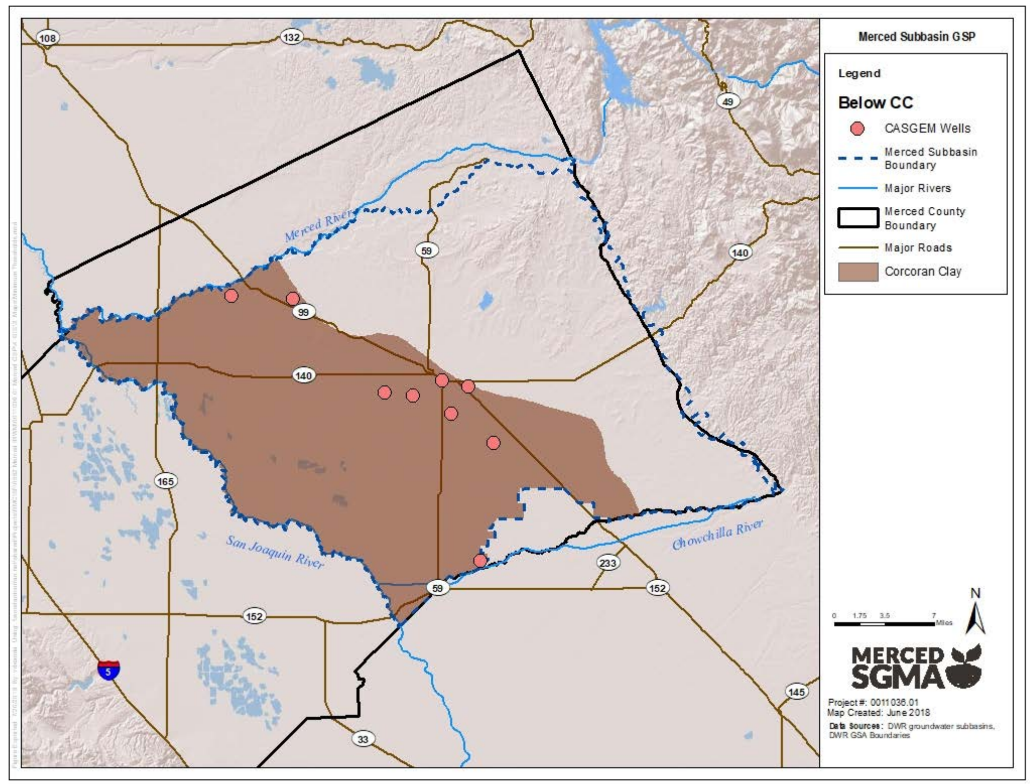

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Minimum Thresholds – Approach
Representative Monitoring Sites

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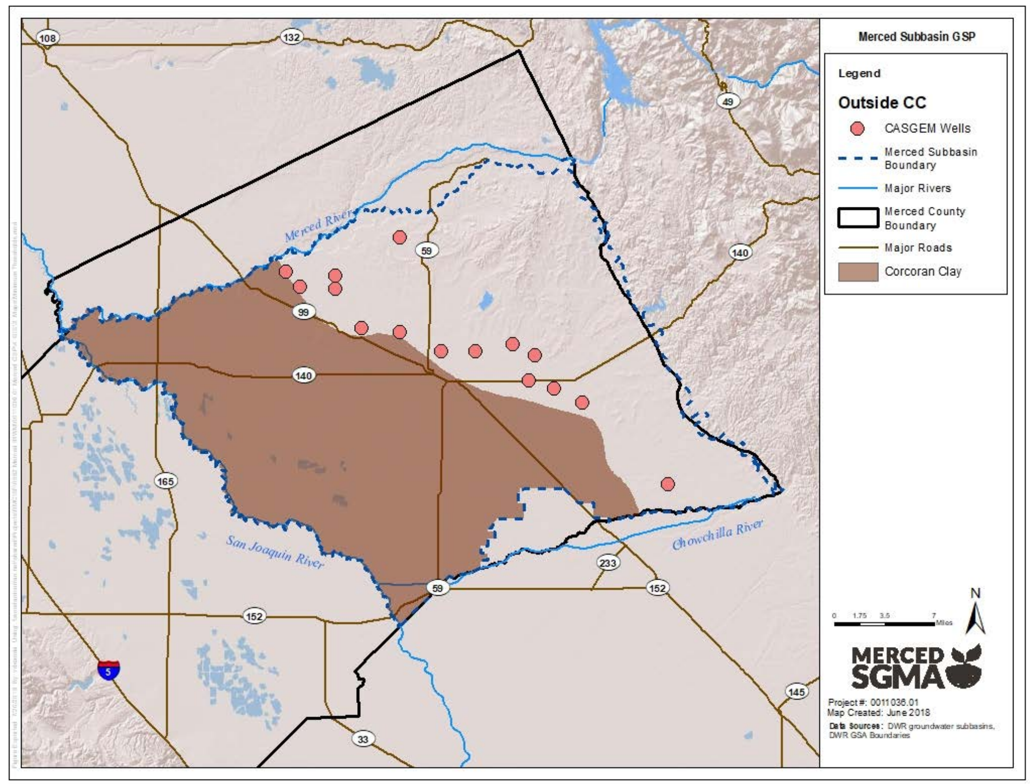
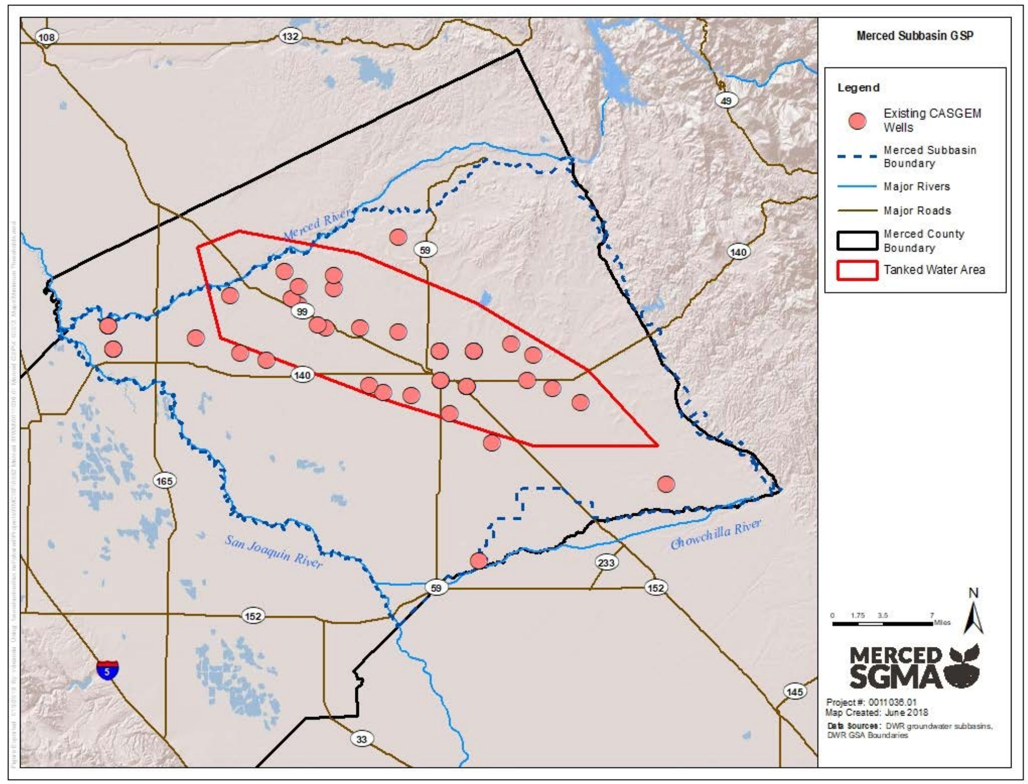


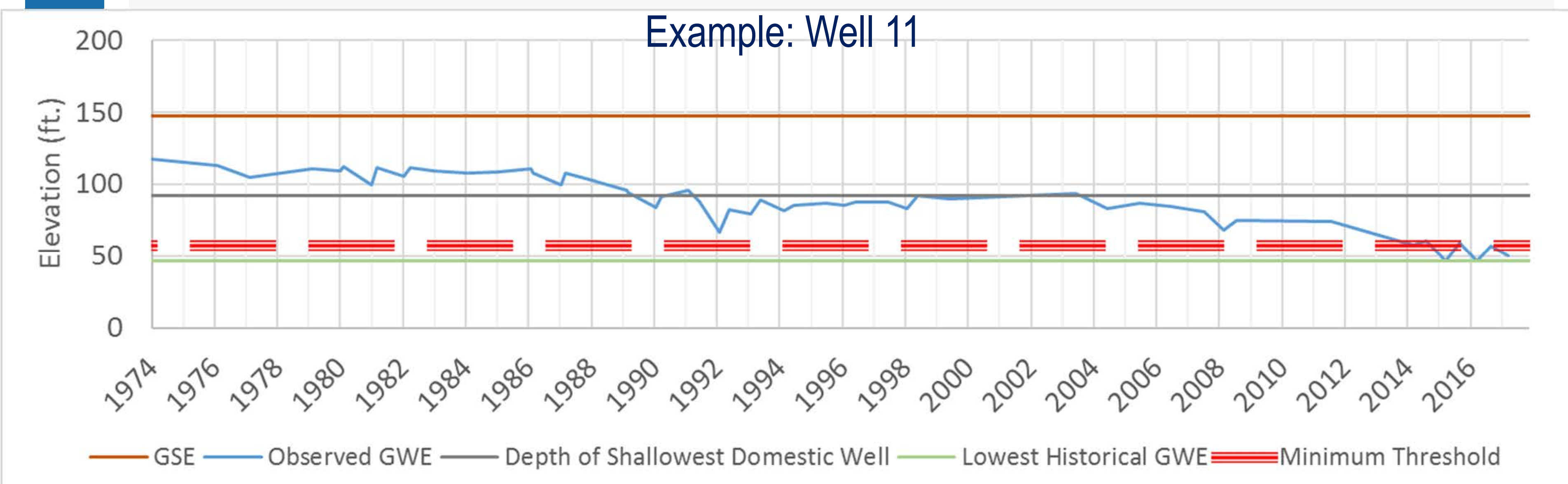
Minimum Thresholds – Approach Representative Monitoring Sites

- Analysis varies based on Emergency Tanked Water Program – Considered indicative of Undesirable Results



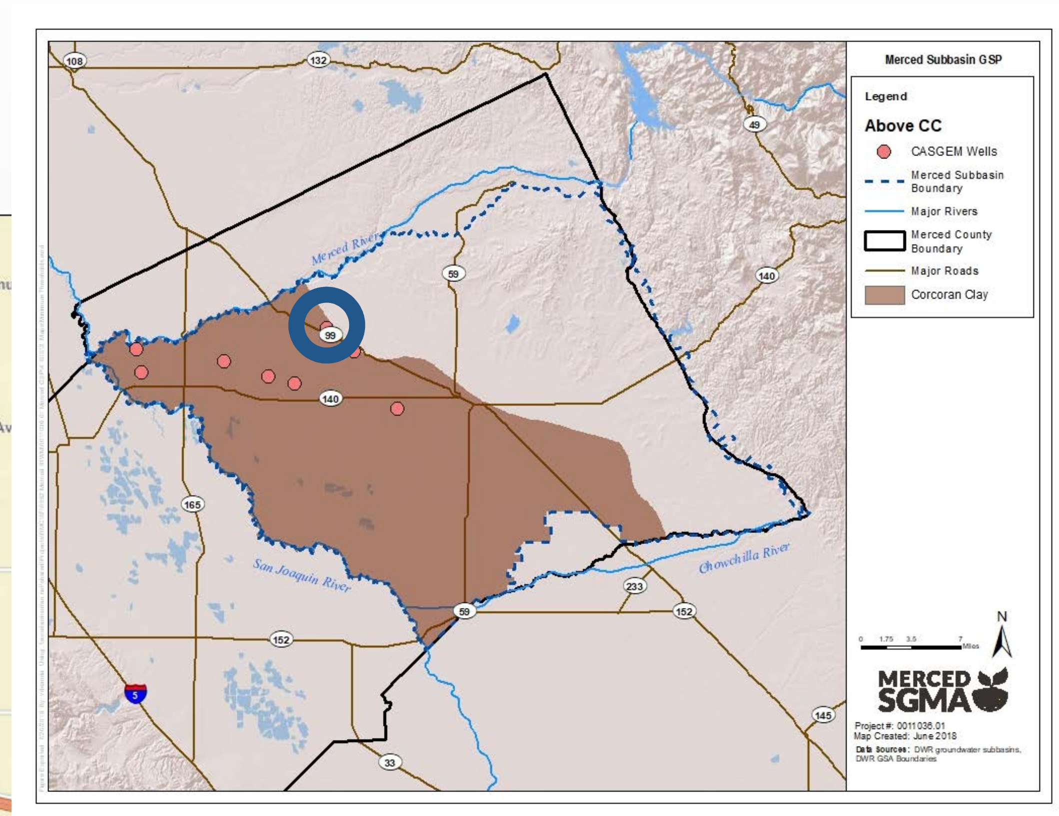
Minimum Thresholds – Approach
Tanked Water Impacted Area

- Minimum threshold is defined as the deepest of either
  - Bottom of the shallowest domestic well within a 3 mile radius of the representative monitoring site
  - Pre-1/1/2015 historical low groundwater elevation at the monitoring well
- Only applied above and outside of Corcoran Clay



Where is Well 11?

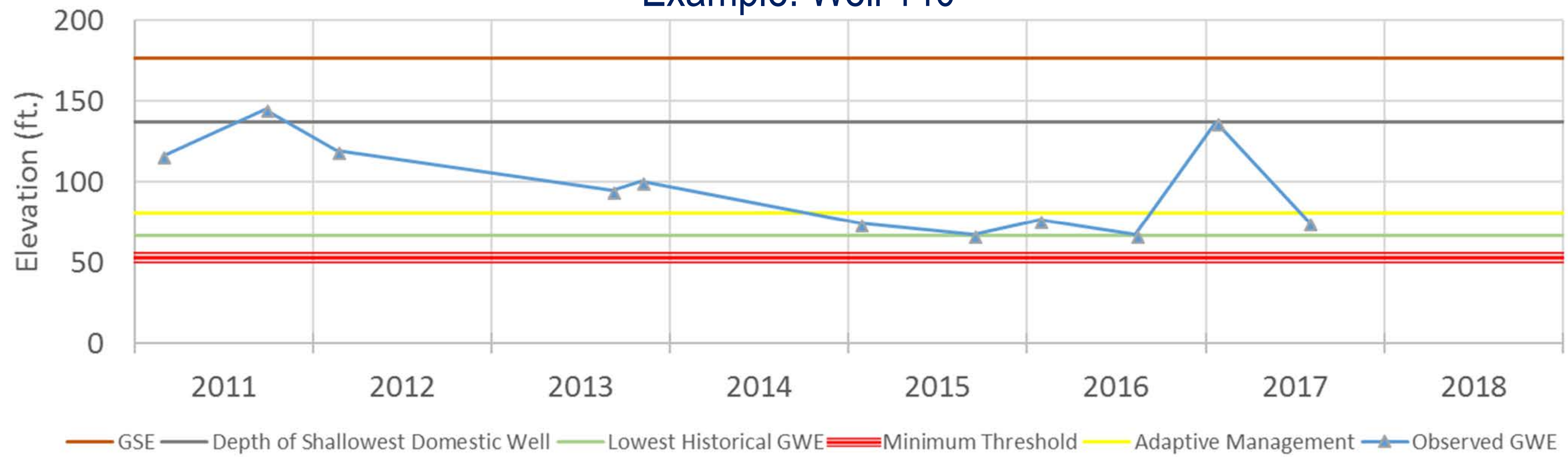
Well 11



Minimum Thresholds – Approach
Outside of Tanked Water Area / Sub Corcoran

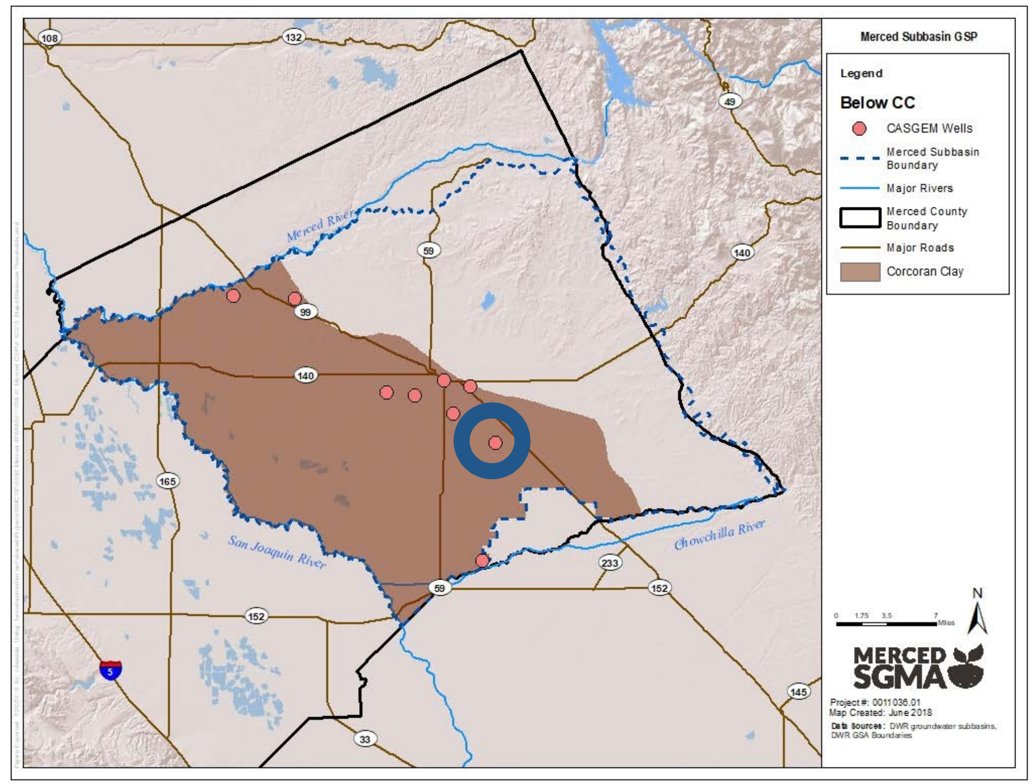
- Identify the deepest of either
  - Bottom of the shallowest domestic well within a 3 mile radius of the representative monitoring site
  - Historical low groundwater elevation at the monitoring well
- Apply a +/- 20% buffer of past 5 year to form an adaptive management zone, resulting in the Minimum Threshold
- Buffer incorporates data uncertainty and lack of historical URs

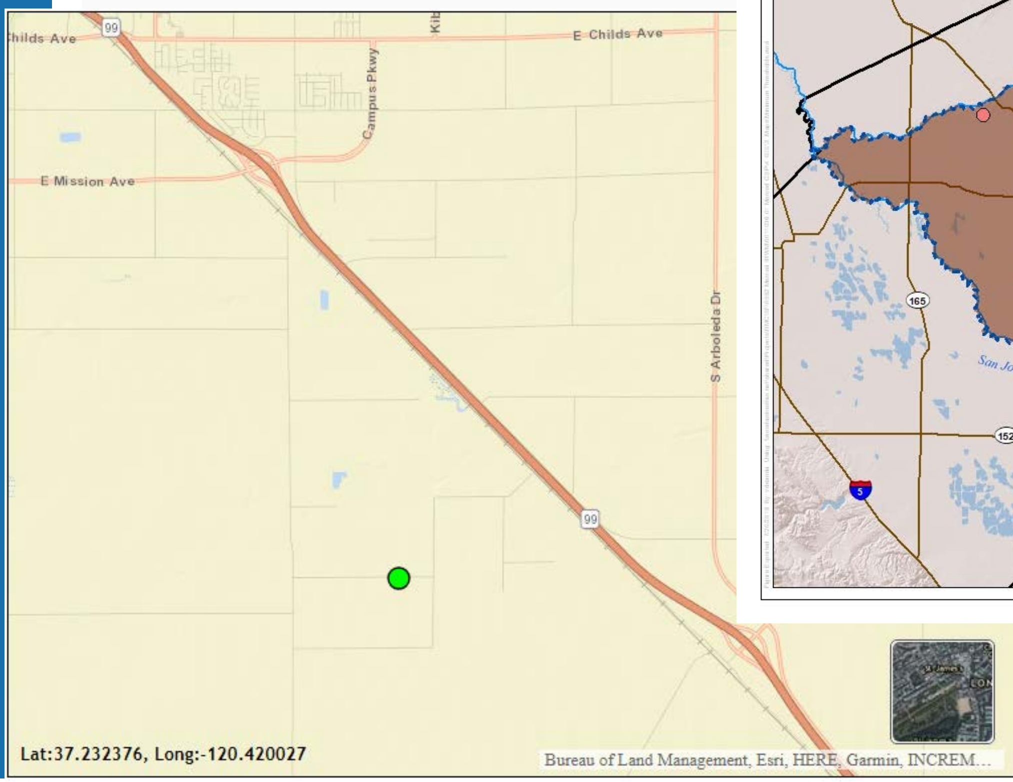
Example: Well 140



Where is Well 140?

Well 140





Minimum Thresholds – Approach
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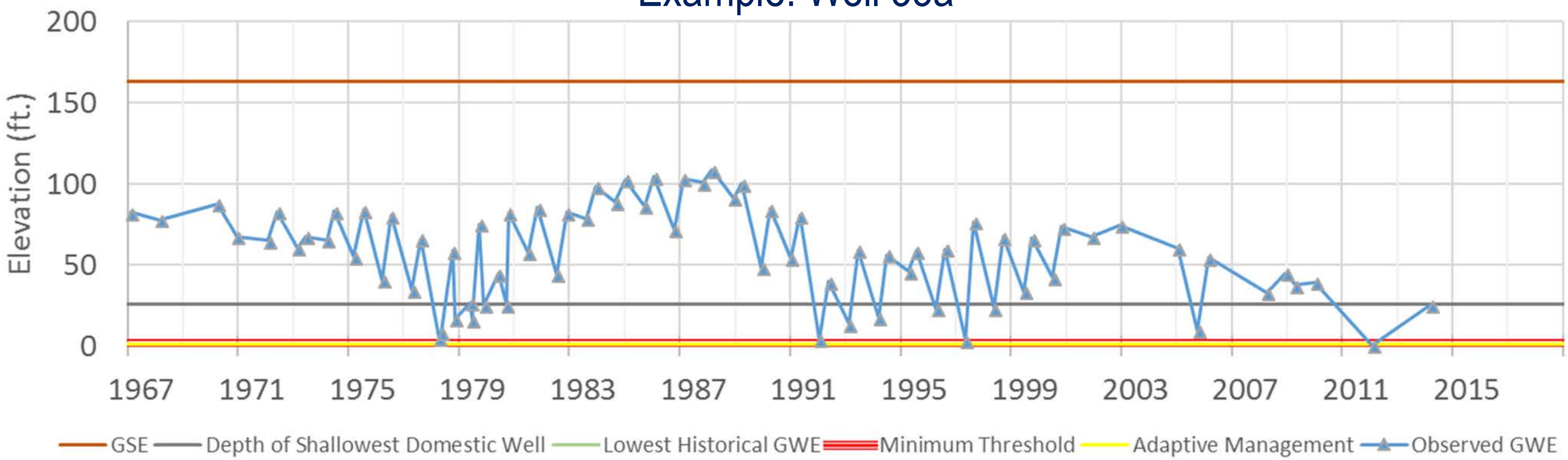
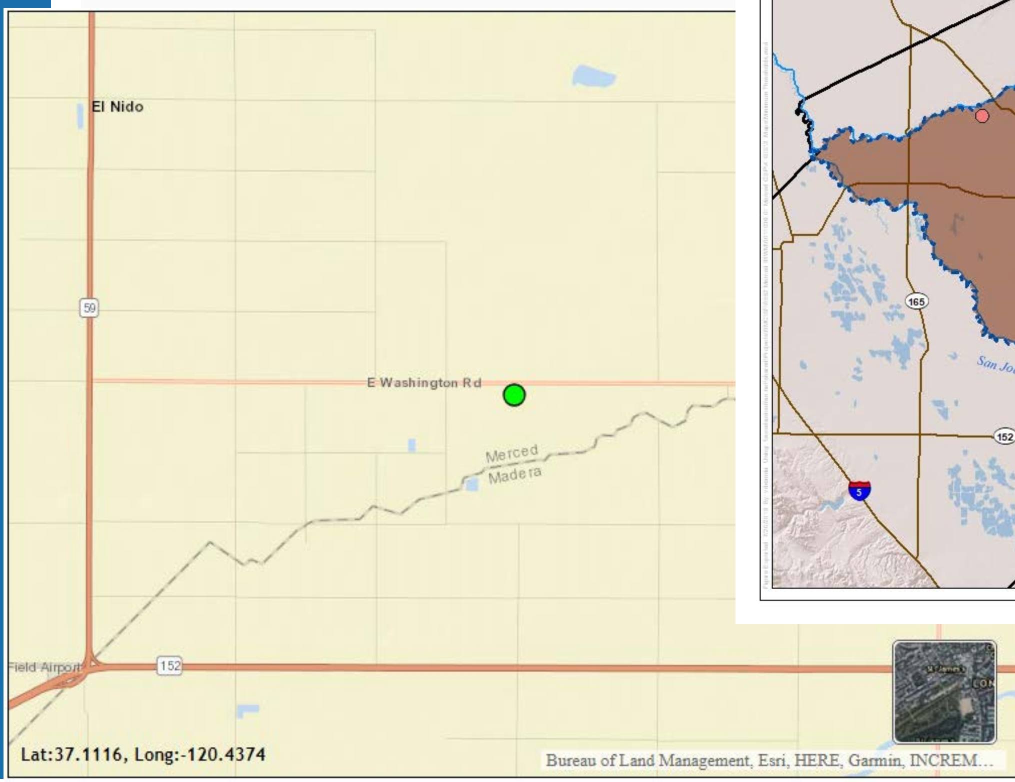
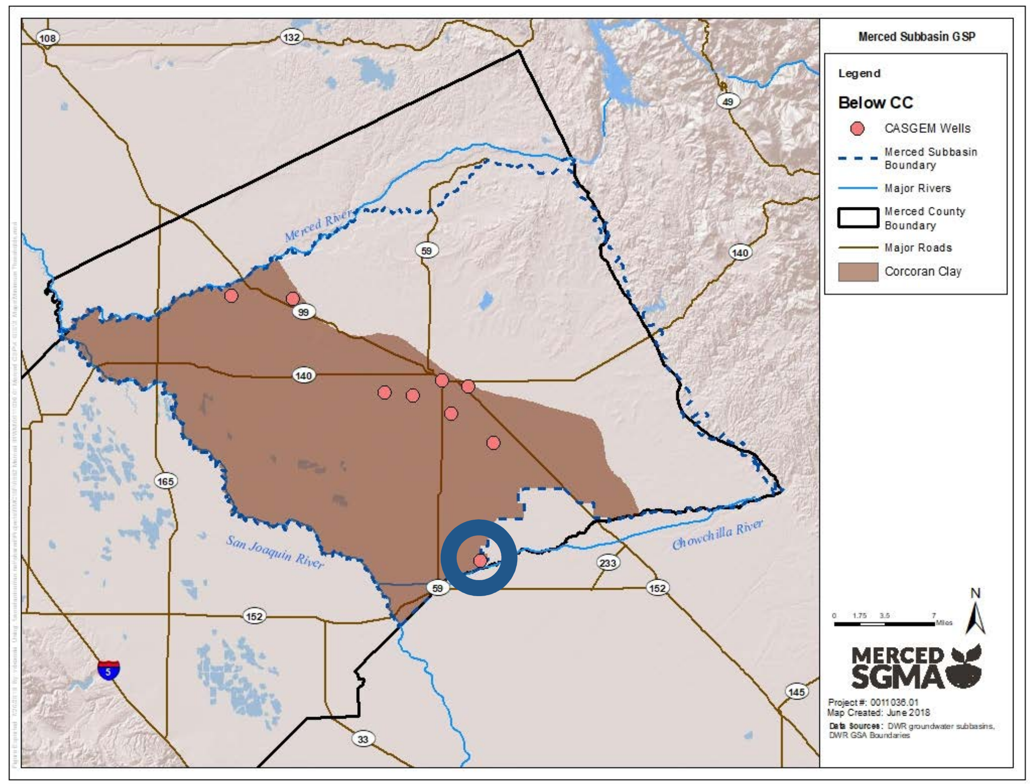
Example: Well 33a



Where is Well 33a?

Well 33a





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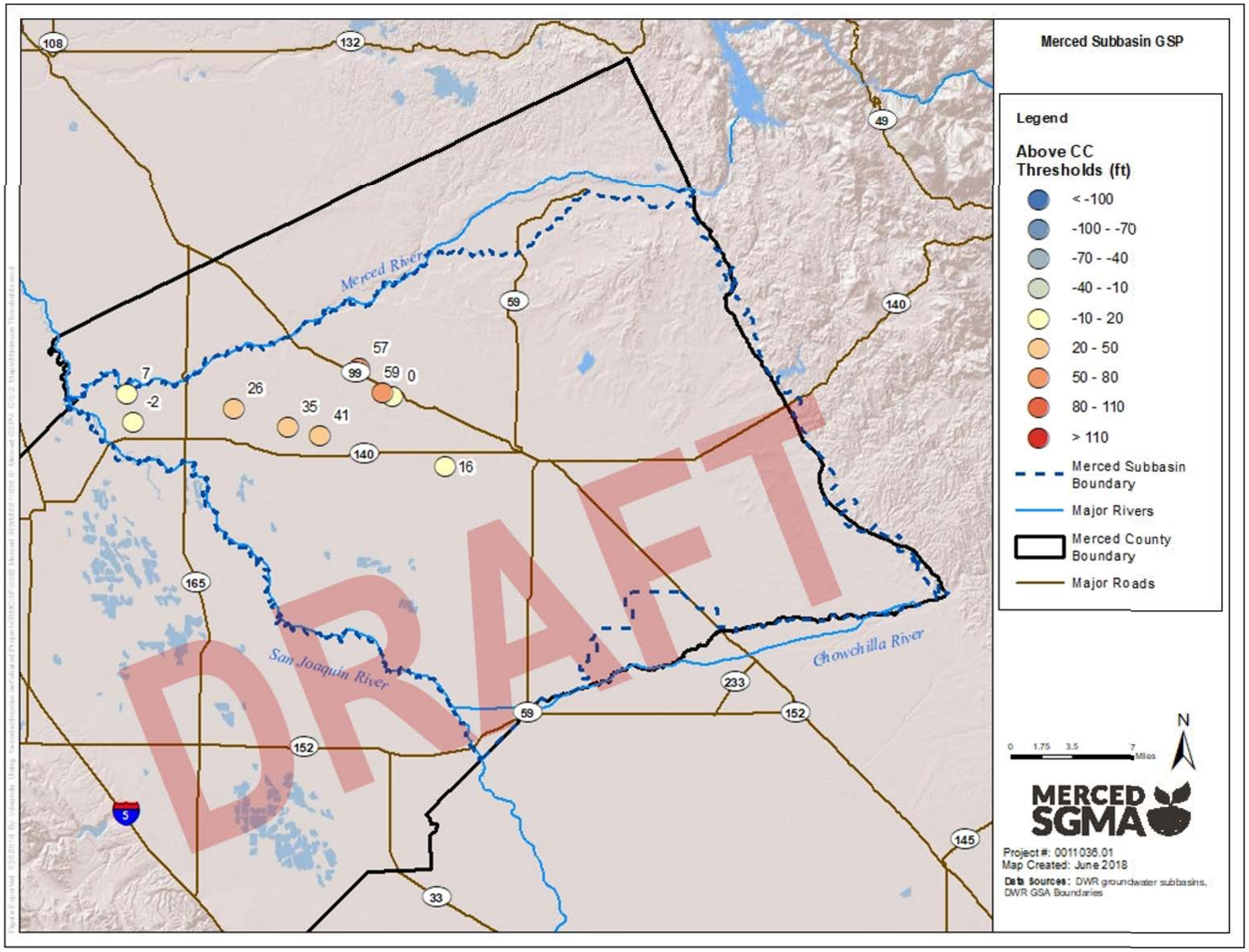
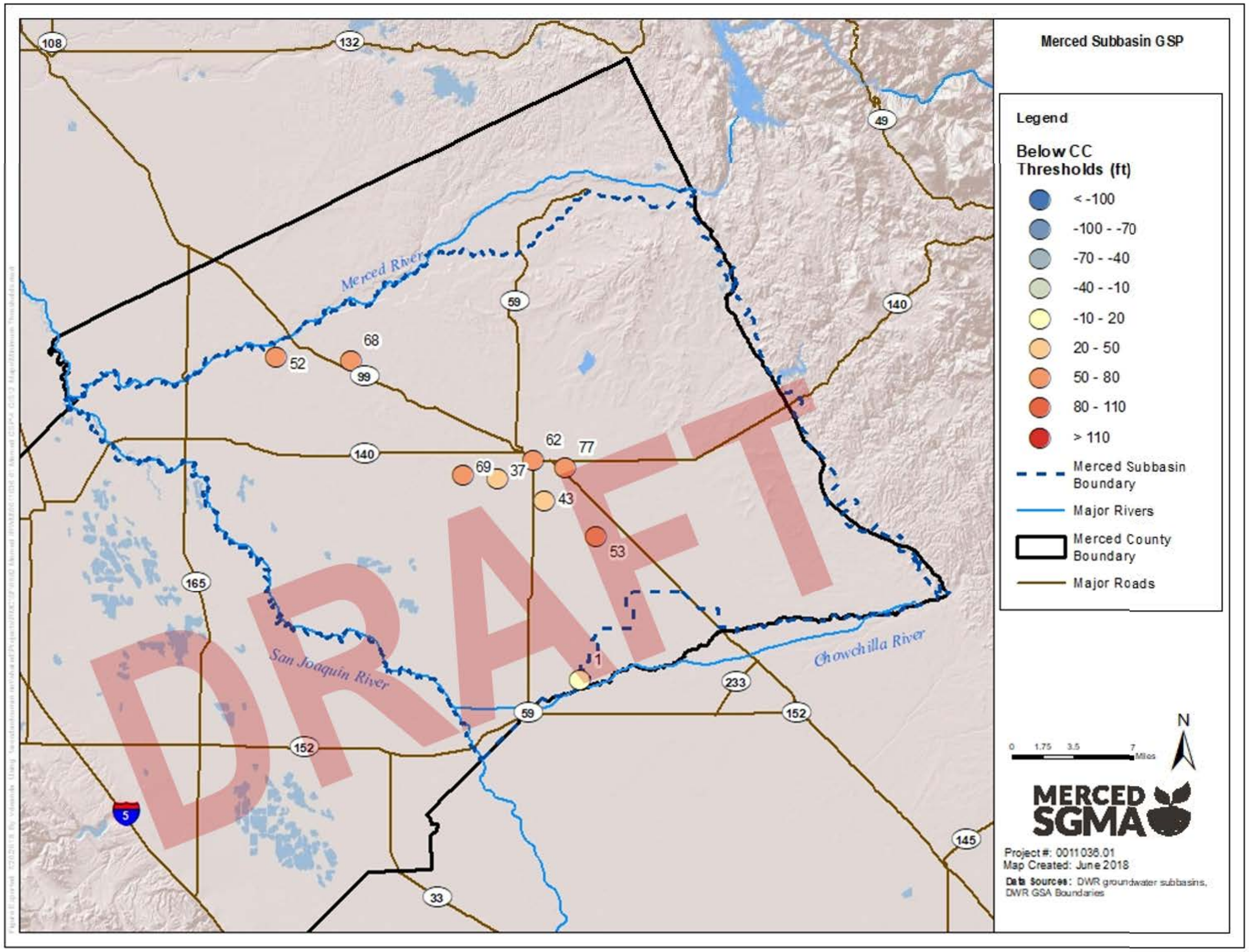
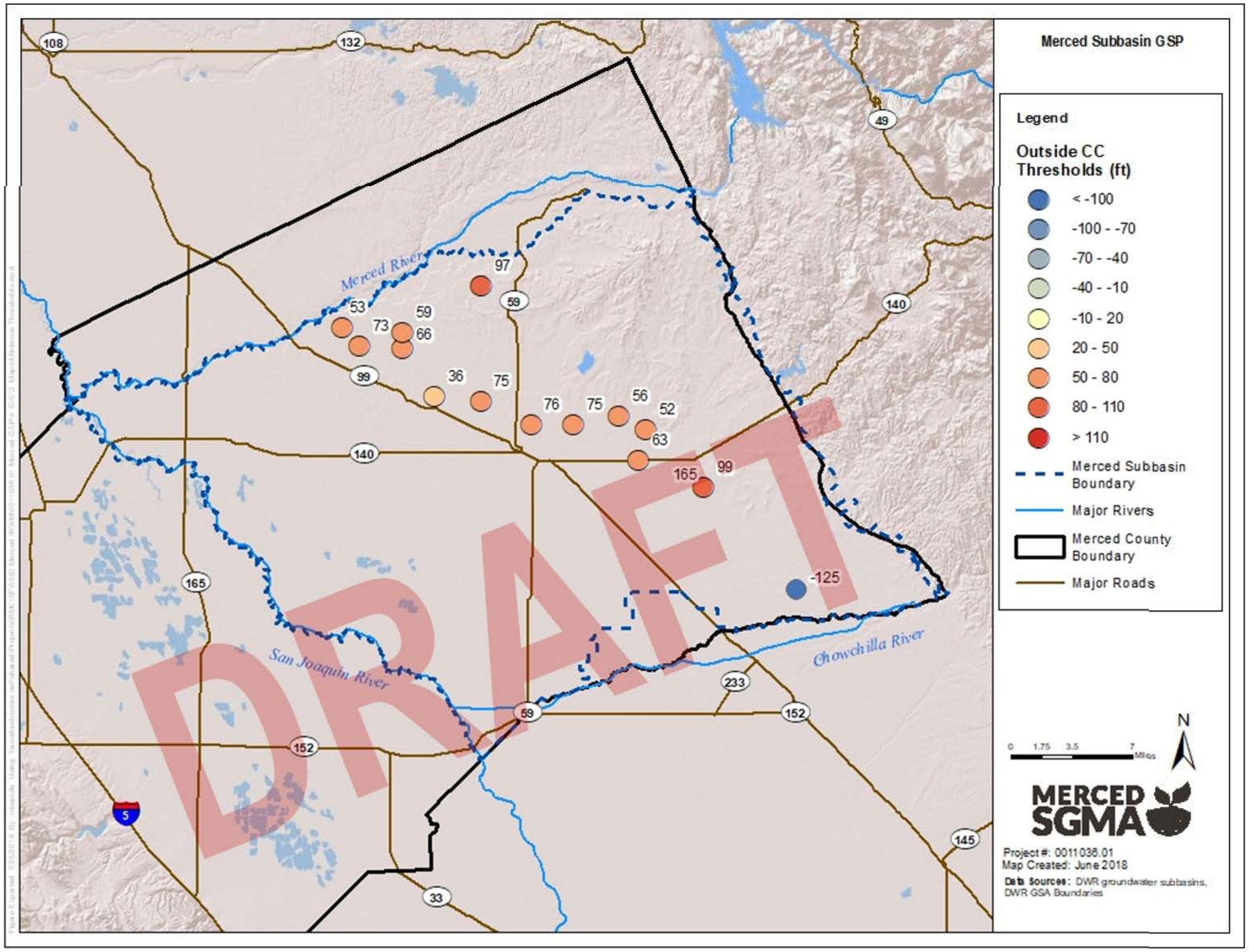
Potential Minimum Thresholds – Above Corcoran Clay



Potential Minimum Thresholds – Below Corcoran Clay



Potential Minimum Thresholds – Outside of Corcoran Clay



Next Steps

- Review draft thresholds for issues related to data and local conditions
- Compare potential thresholds to 2017 elevations
- Coordinate with GSAs to further refine thresholds at wells
- Coordinate with GSAs to identify wells in gap areas
- Incorporate GDE information

Minimum Thresholds Need to be Developed for All Six Sustainability Indicators

- Chronic Lowering of Groundwater Levels
- ~~Reduction in Groundwater Storage~~
- ~~Seawater Intrusion~~
- Degraded Water Quality
- Land Subsidence
- Depletion of Interconnected Surface Water

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Minimum Thresholds – Water Quality

- Adverse groundwater quality by area (constituents listing)
- Salinity data sources
- CV-SALTS
- Initial Assessments Zones (IAZs)
- Average TDS concentrations
  - Average TDS Concentration (2000 – 2016)
  - Average TDS Concentration ABOVE Corcoran Clay (2000 – 2016)
  - Average TDS Concentration BELOW Corcoran Clay (2000 – 2016)
- TDS Concentrations Statistics for the Merced Subbasin
- 2014 Groundwater Assessment Report (Electrical Conductivity and TDS)
- Sources of High-TDS Water

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Minimum Thresholds – Water Quality

- Adverse groundwater quality by area (constituents listing)

MERCED COUNTY DEPARTMENT OF PUBLIC HEALTH
Division of Environmental Health
260 East 15th Street, Merced, CA 95341-6216
(209) 381-1100 fax (209) 384-1593

Adverse Groundwater Quality by Area in Merced GSP*

*Adjusted from list sent by Ron Rowe to include only areas within Merced GSP

Atwater	Nitrates, DBCP[2], EDB[2], TCE[3] and 1,2,3 TCP[2&3]
Cressey	Nitrates & DBCP
El Nido	Nitrates, Arsenic, Sodium, & TDS
Le Grand	Hard Water[1]
Livingston	Nitrates, Arsenic, DBCP, EDB, TCE and 1,2,3 TCP
McSwain Area	Nitrates, DBCP, EDB, TCE and 1,2,3 TCP
Merced	Nitrates & Hard Water
Planada	DBCP & Hard Water
Stevinson	Arsenic, Sodium, TDS, Manganese, Chlorides, Hard Water, & Tannins
Winton	Nitrates, DBCP, EDB, TCE and 1,2,3 TCP

[1] Hard Water = Total hardness > 150 mg/L (Mg/L = milligrams per liter = parts per million)
[2] Dibromochlopropane (DBCP), Ethylene Dibromide (EDB) and 1,2,3 Trichloropropane (1,2,3 TCP) are soil fumigants, use of DBCP and EDB was banned in 1977.
[3] TCE and 1,2,3 TCP are solvent/degreases.
[4] TDS refers to the total dissolved solids in water.

General Notes:

a. Chlorides, manganese, hard water, iron, tannins, TDS, and sodium in drinking water are, of themselves, not known causes of health problems.

b. The water quality information above refers to private wells in unincorporated areas and does not necessarily apply to the municipal water supply of the towns and cities.

Salinity Data Sources

Two Main Existing Nitrate and Salinity Monitoring Programs

CV-SALTS

Central Valley Salinity Alternative Sustainability Initiative

- Compilation of existing state (i.e GeoTracker, USGS, etc.)
- Focused on TDS & nitrate concentrations
- Data for entire Central Valley
- Luhdorff & Scalmanini and Larry Walker Associates compiled & analyzed statewide data in 2016

ILRP

Irrigated Lands Regulatory Program

- Focused on concentrations of pesticides, toxicity, nutrients (including TDS + nitrates) in surface & groundwater
- Growers biannually sample & submit data for irrigation and domestic wells (began in 2017)
- Eastern San Joaquin Water Quality Coalition: Groundwater Assessment Report (2014)

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CV SALTS

Focused on nitrates and total dissolved solids (TDS) across the Central Valley

Data Sources – Groundwater Quality from:

- Geotracker Groundwater Ambient Monitoring and Assessment (GAMA) program
- USGS National Water Information System (NWIS)
- California Department of Public Health
- California Department of Water Resources
- Central Valley Water Board Waste Discharge Requirement (WDR) Dairy Data

TDS data from 231 wells within the Merced Subbasin

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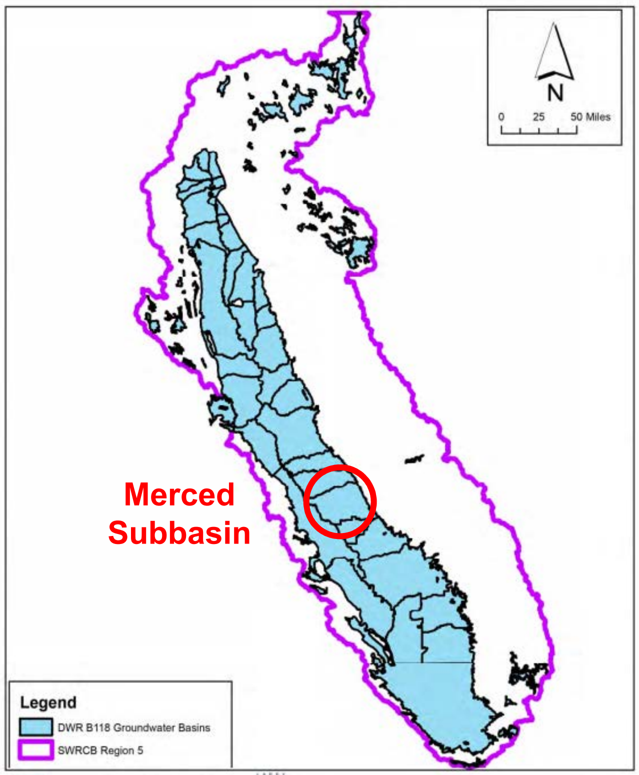
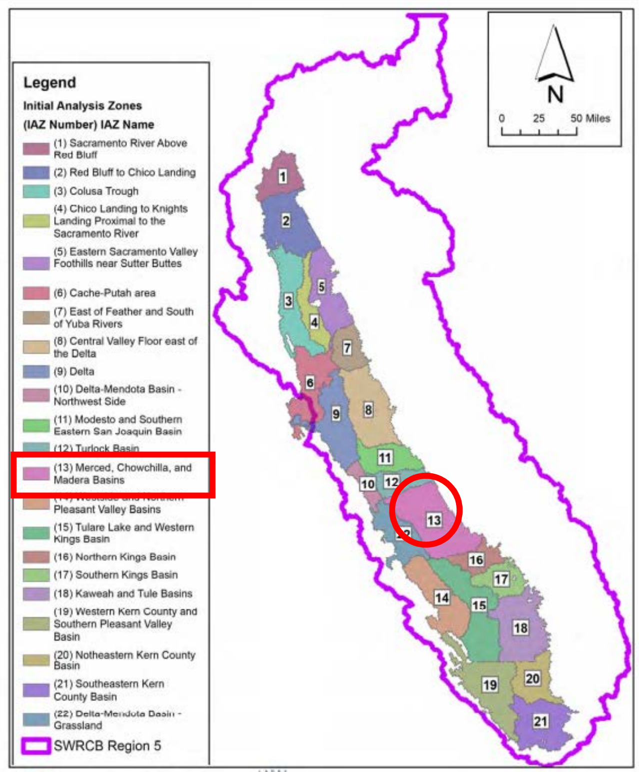
Initial Assessment Zones (IAZs)

IAZs:

- 22 hydrologically-based areas of analysis (used for the conceptual model)
- Merced is located within IAZ #13





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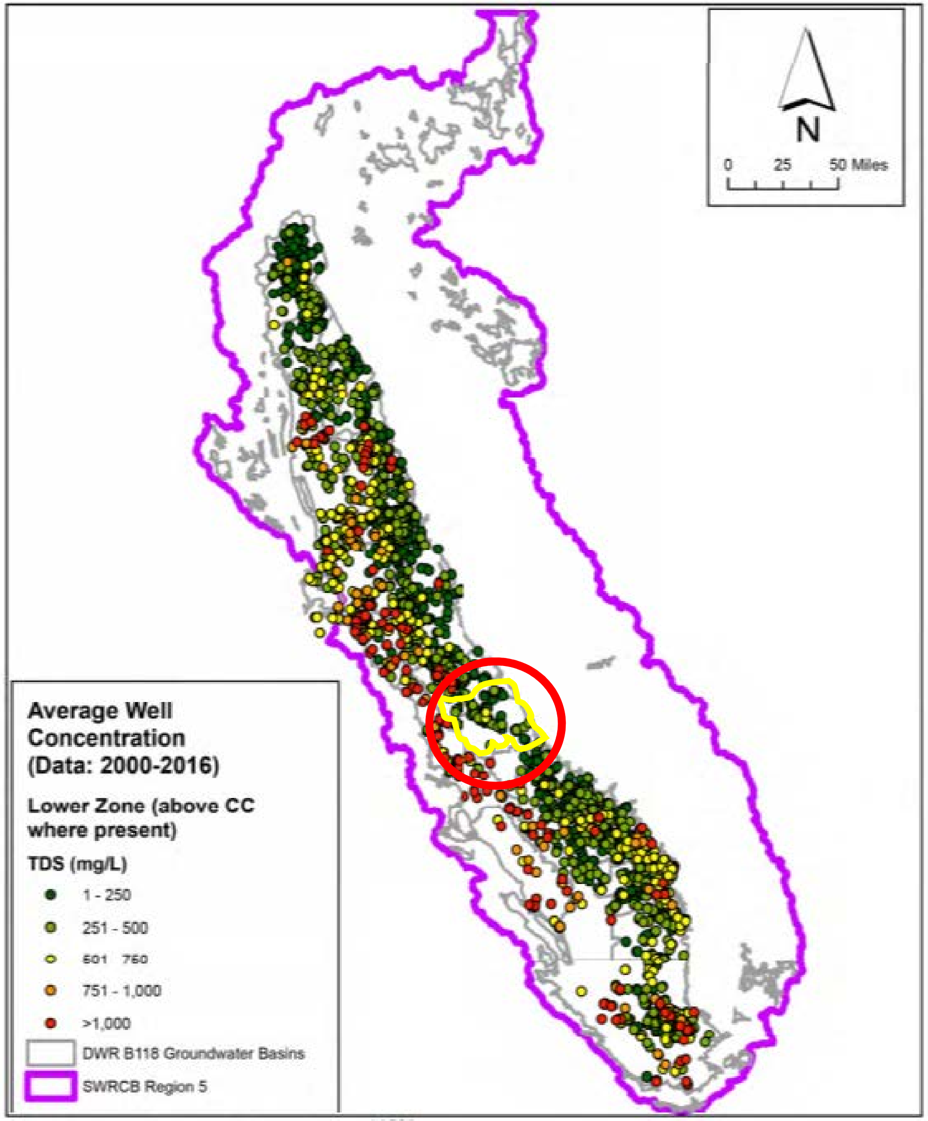
Average TDS Concentration (2000 – 2016)

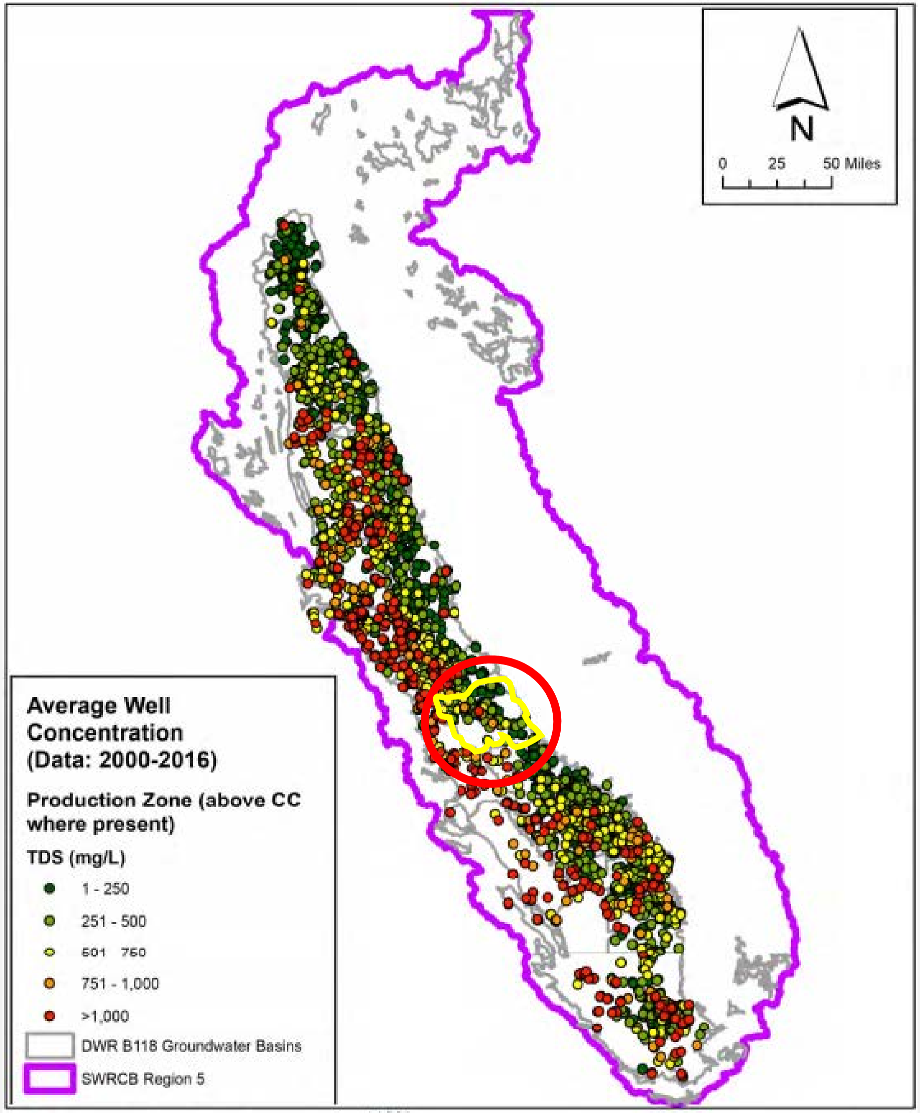


TDS concentrations

< 751 mg/L

Source: Luhdorff & Scalmanni and Larry Walker, 2016

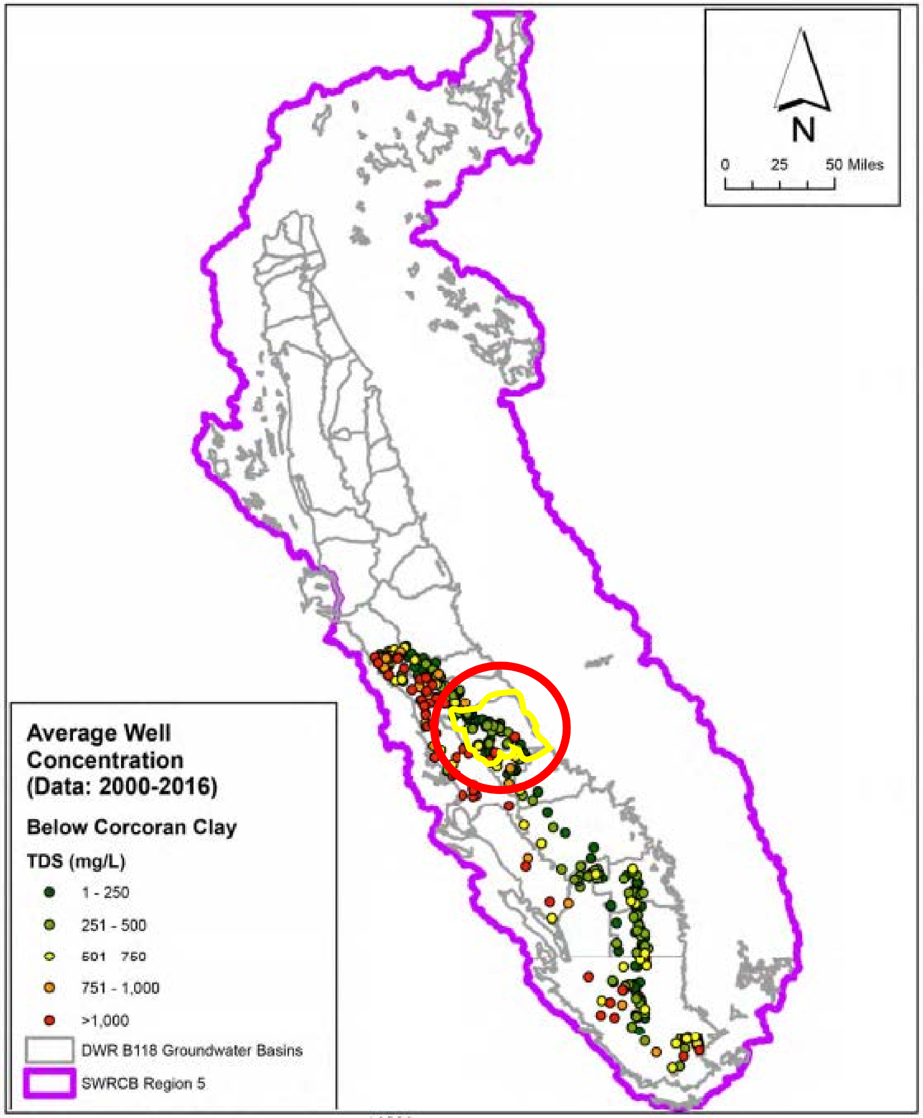
Average TDS Concentration ABOVE Corcoran Clay (2000 – 2016)



Highest TDS concentrations found in the northwest
> 751 mg/L

Source: Luhdorff & Scalmanni and Larry Walker, 2016

Average TDS Concentration BELOW Corcoran Clay (2000 – 2016)



Lowest in the North

< 501 mg/L

Increase in the Southwest

> 1,000 mg/L

Source: Luhdorff & Scalmanni and Larry Walker, 2016

TDS Concentrations Statistics for the Merced Subbasin

Average TDS concentrations in the Subbasin range from 90 – 2,005 mg/L

		Average Well TDS Concentration Statistics				
DWR B118 Groundwater Basin Code	**Aquifer Zone**	**Number of Wells**	**Minimum**	**Average**	**Median**	**Maximum**
5-22.01	Upper Zone	451	74	2,418	740	178,909
	Upper and Lower Zone	175	83	335	292	1,230
	Lower Zone	232	35	304	249	1,911
	Below CC Zone	14	186	343	297	718
	Below Production Zone	6	132	1,045	594	3,406
	Unknown	41	92	308	214	957
5-22.02	Upper Zone	186	81	602	489	3,811
	Upper and Lower Zone	94	67	312	270	1,121
	Lower Zone	79	67	273	206	1,700
	Below CC Zone	108	92	465	323	5,974
	Below Production Zone	2	160	178	178	196
5-22.03	Upper Zone	117	37	506	488	1,758
	Upper and Lower Zone	26	74	394	393	1,176
	Lower Zone	53	74	285	225	1,136
	Below CC Zone	104	144	377	260	1,819
5-22.04	Upper Zone	80	111	498	392	1,951
	Upper and Lower Zone	13	125	249	246	354
	Lower Zone	62	111	289	211	2,005
	Below CC Zone	74	90	268	224	1,035
	Below Production Zone	2	246	280	280	314

Source: Luhdorff & Scalmanni and Larry Walker, 2016

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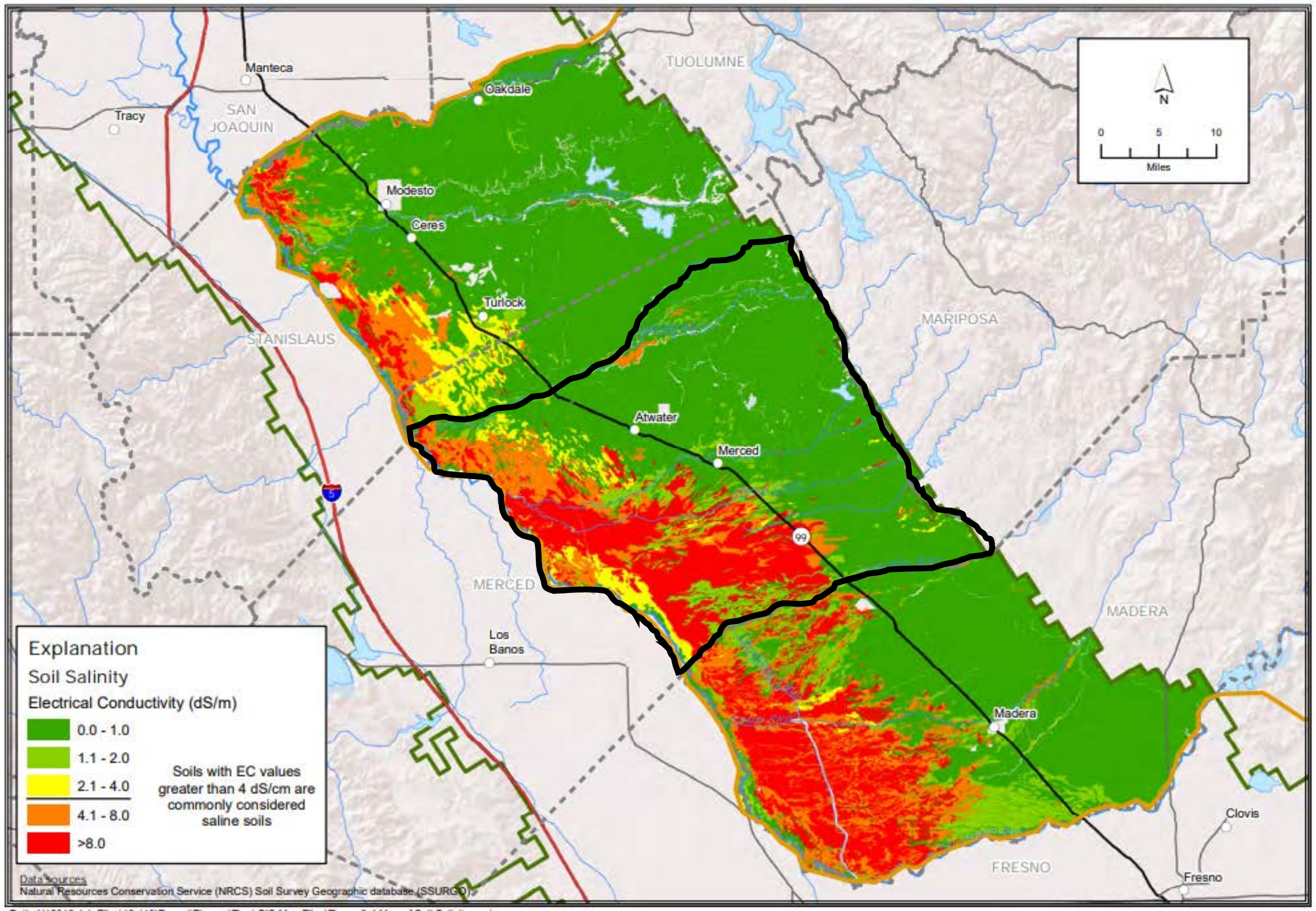
ILRP: 2014 Groundwater Assessment Report – Salinity as Electrical Conductivity



Salinity (as EC) highest in the west & southwest

Source: Luhdorff & Scalmanini, 2014

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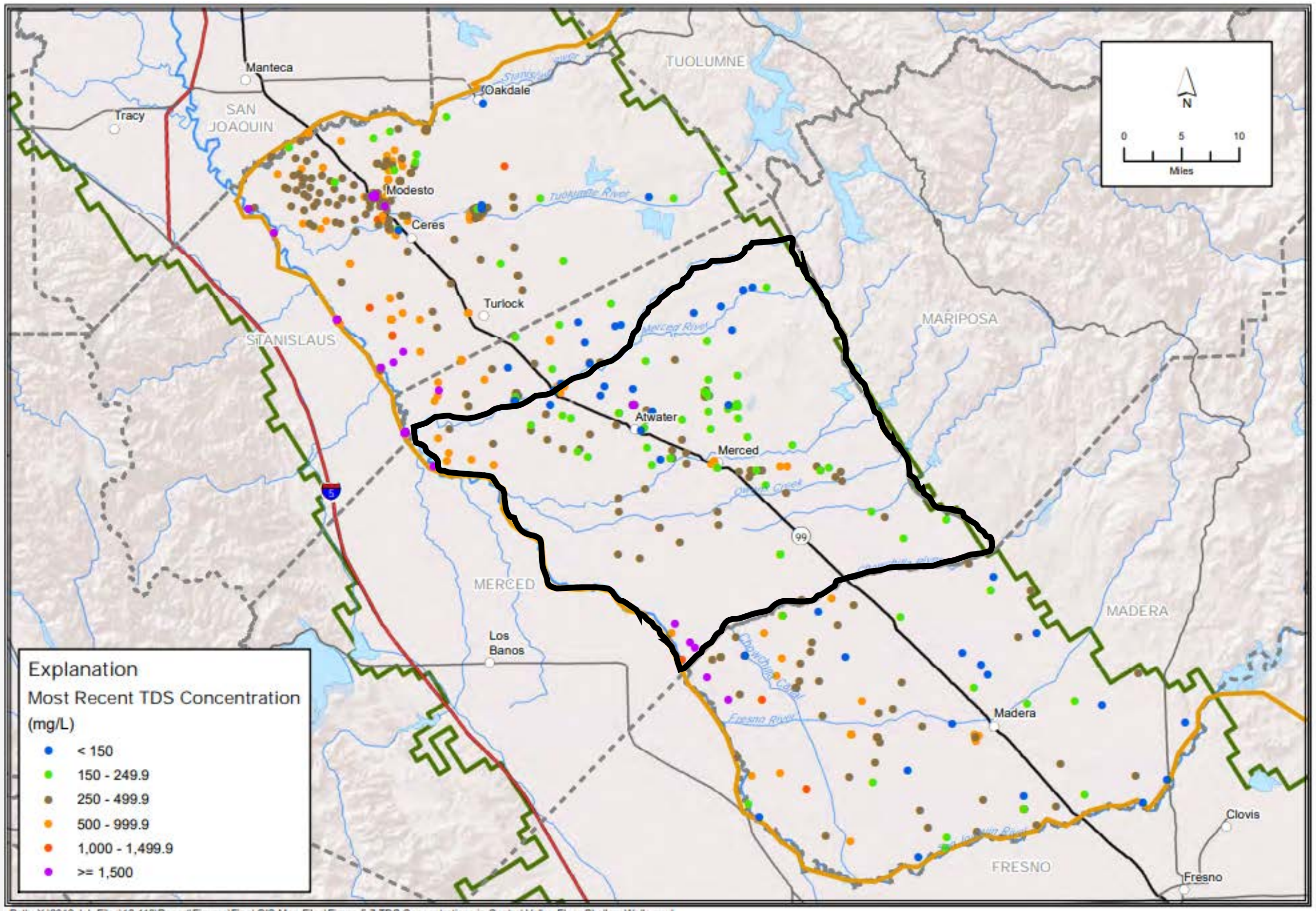
ILRP: 2014 Groundwater Assessment Report – Salinity as TDS



TDS highest in Northwest & Southwest

*Data from 2000 – 2014

Source: Luhdorff & Scalmanini, 2014

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Sources of High-TDS Water

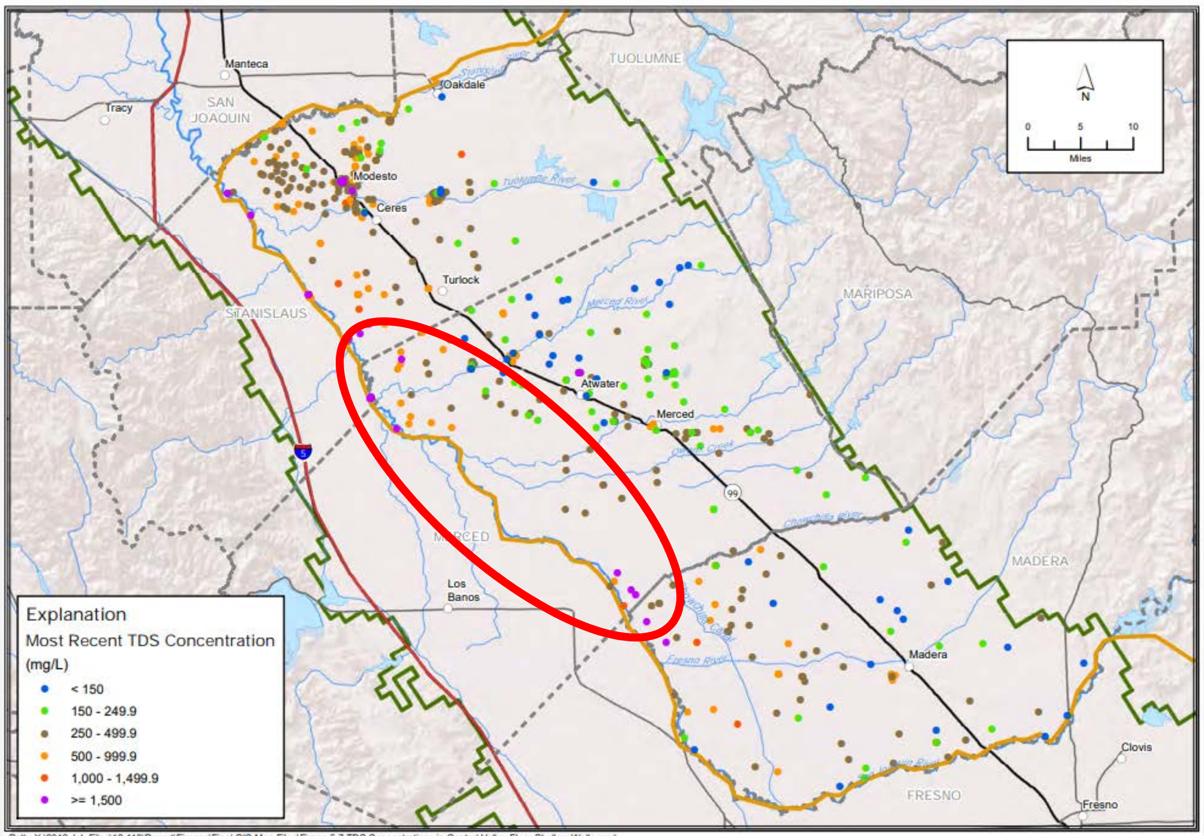
Primary Source

1. Saline, Connate Water from Marine Sedimentary Rocks
   a. Pumping of Wells - results in upwelling saline brines
   b. Corcoran Clay – Naturally impedes high TDS groundwater, but wells perforated create channels for TDS to migrate
2. Migration of poor quality water from west

Source: AMEC, 2008

Potential Management Area

Allow for Different level of Monitoring of Salinity in the Area



DECISION POINT: THRESHOLD OPTIONS

1. Set contour line
2. Select # of wells to not exceed a WQ threshold

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Minimum Thresholds – Water Quality

- Several constituents of concern in the basin
- GSP must focus on a causal nexus between water quality and SGMA groundwater management
- Thresholds are not appropriate for many constituents
  - Cannot be managed through SGMA
  - Are addressed through other programs (CV-SALTS, ILRP, RWQCB, EPA, others)
  - Plumes (Cal/Federal EPA, Regional Board, DTSC)
- Nexus exists for migration of low-quality (higher-TDS) water from the west / northwest
  - Control quality of recharge water

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Minimum Thresholds Need to be Developed for All Six Sustainability Indicators

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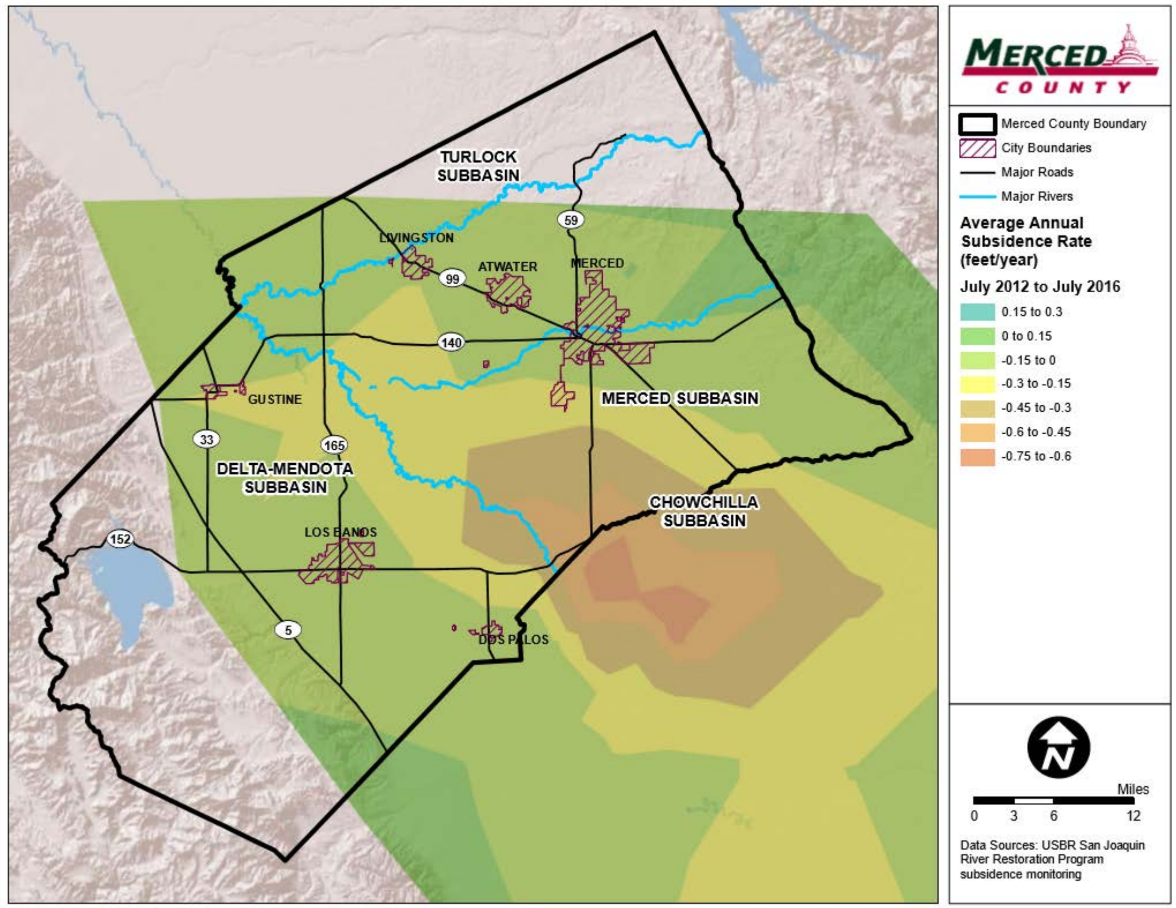
Minimum Thresholds – Land Subsidence

Average Annual Subsidence Rate (feet/year)
July 2012 – July 2016



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Next Steps

- Subsidence thresholds can be defined through
  - Subsidence rates
  - Groundwater elevation as a proxy
- Recommended approach is groundwater elevation
  - GSAs can actively manage elevations
  - Subsidence rates may already be locked-in, with long-term subsidence due to pre-2015 groundwater elevations
  - Thresholds likely set at levels prior to 1/1/2015
- Subsidence rates may be reconsidered for consistency with neighboring subbasins

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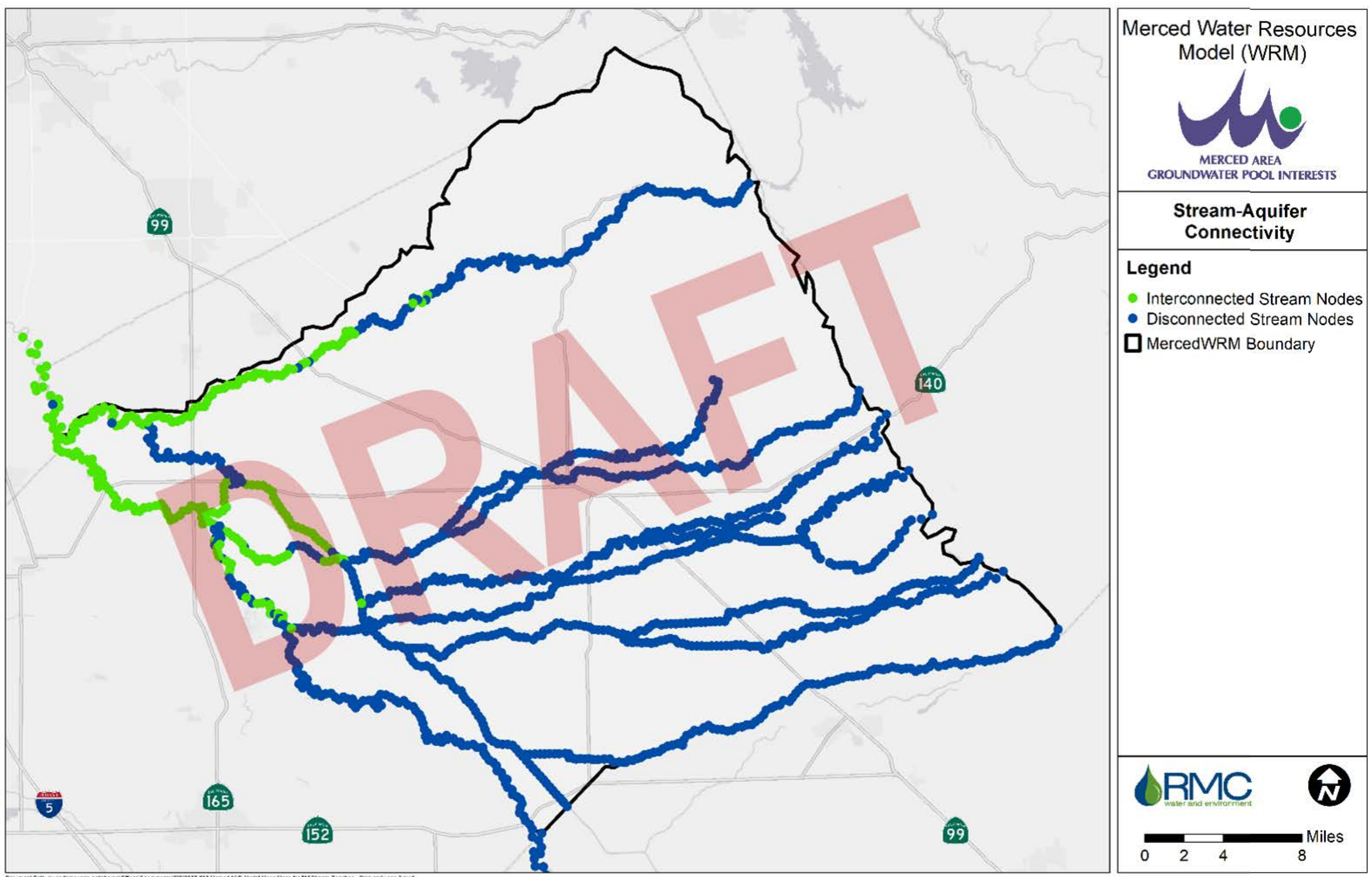
Minimum Thresholds – Depletion of Interconnected Surface Water

- Stream-Aquifer Connectivity Reveals Merced and San Joaquin Rivers as Potentially Affected



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Next steps

- Develop proposed groundwater elevation thresholds
- Compare to groundwater elevation sustainability indictor thresholds
- Review with GSAs

Hydrogeologic Conceptual Model

Image courtesy: Veronica Adrover/UC Merced

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Hydrogeologic Conceptual Model (HCM)

- According to DWR regulations, the HCM:
  - Provides an understanding of the general physical characteristics related to regional hydrology, land use, geology geologic structure, water quality, *principal aquifers,* and principal aquitards of the *basin setting*
  - Provides the context to develop water budgets, mathematical (analytical or numerical) models, and monitoring networks
  - Provides a tool for stakeholder outreach and communication

Please note: due to time constraints, slides and discussion of HCM skipped during this presentation

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Hydrogeologic Conceptual Model (HCM), cont'd

- HCM parameters include:
  - Topographic information, surficial (surface) geology, soil characteristics, delineation of existing recharge areas, surface water bodies, source and point of delivery for local and imported water supplies

- HCM Data gaps:
  - Portions of the basin not well understood
  - Plan to fill data gaps in understanding – currently addressing these gaps

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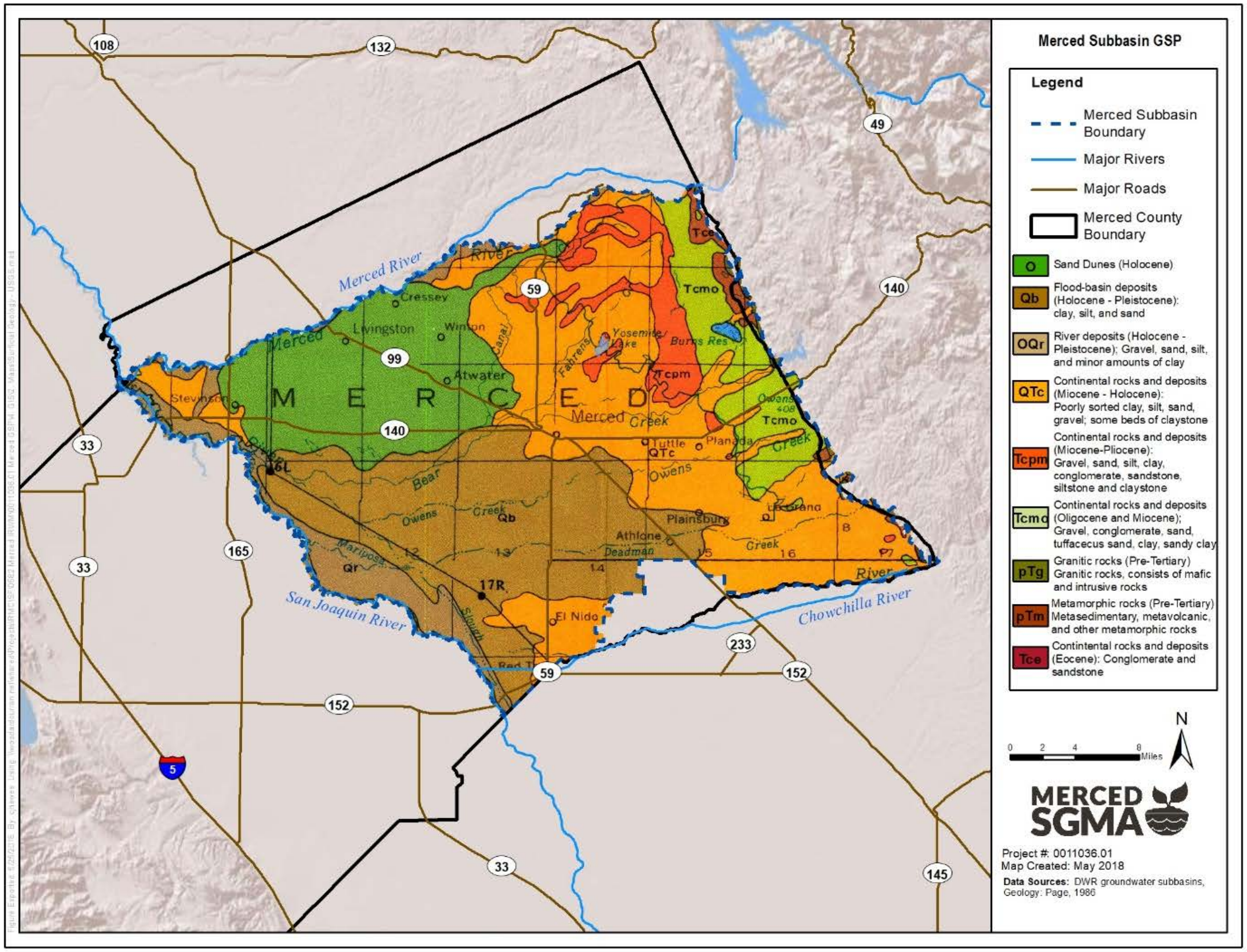
HCM: Surficial Geology



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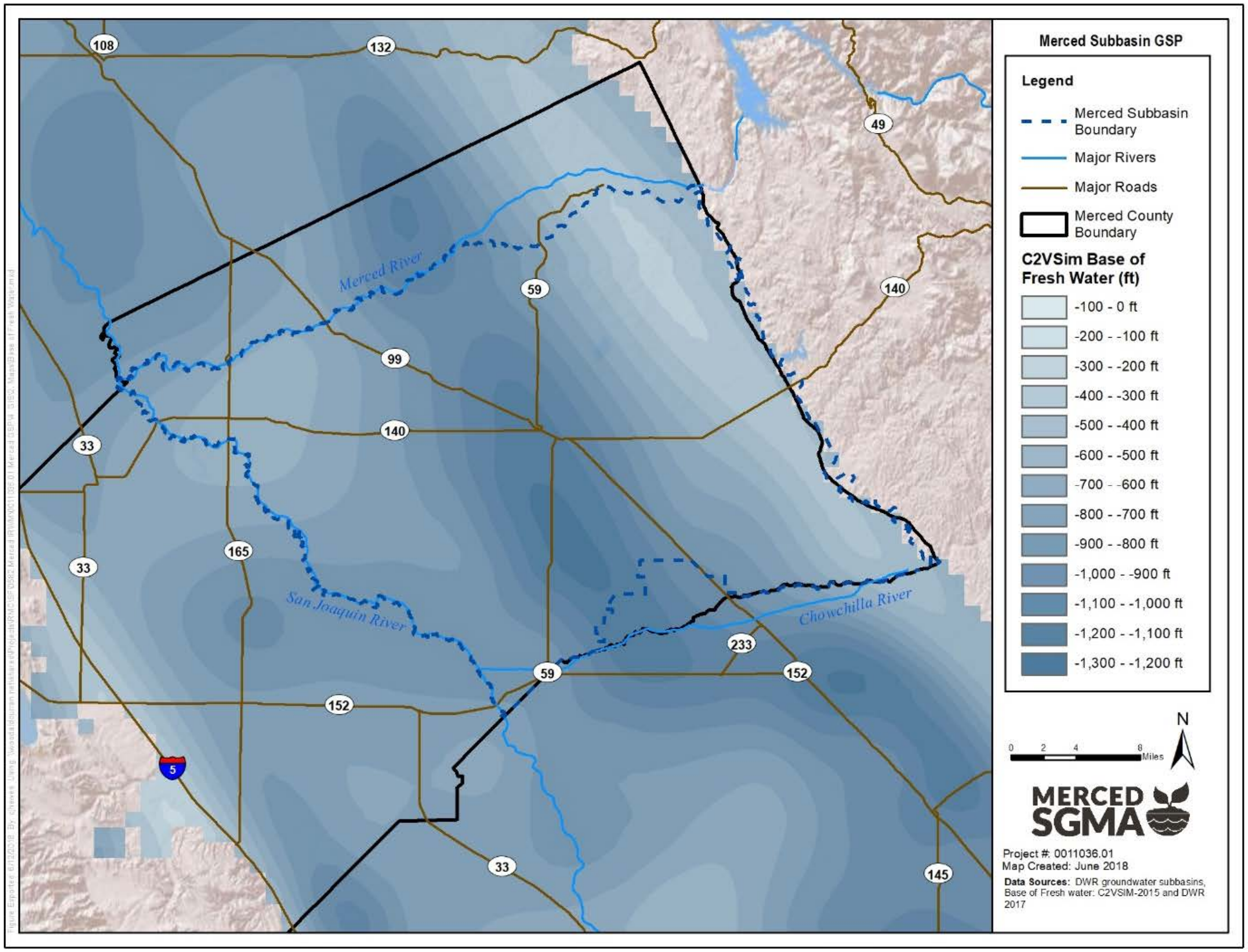
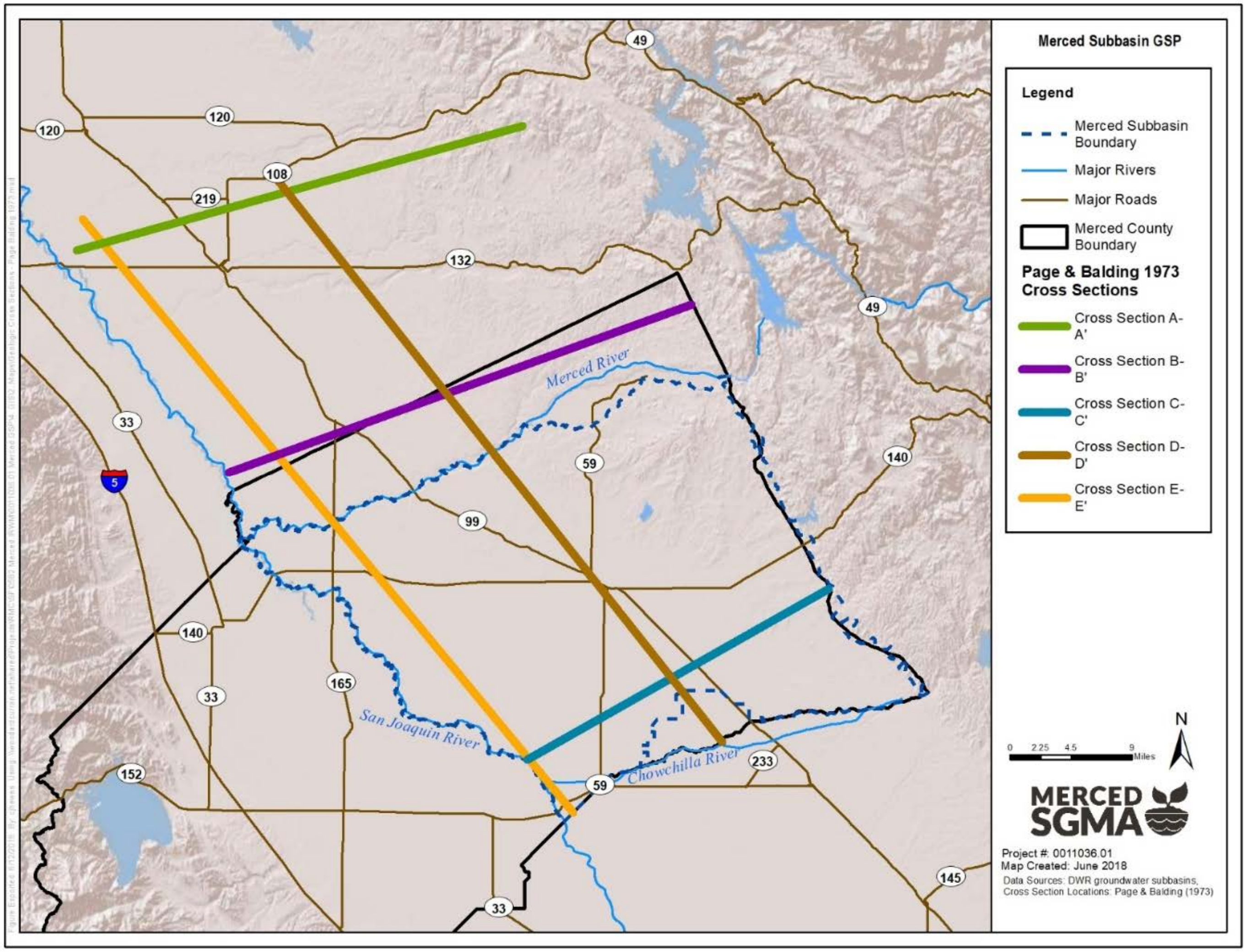
HCM: Base of Fresh Water



HCM: Geologic Cross Sections



Current Conditions Baseline, Projected Water Budget, and Sustainable Yield

Image courtesy: Veronica Adrover/UC Merced

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Water Budgets

- Projected Water Budget: Defining Time Frames

Historical

Uses historical information for hydrology, precipitation, water year type, water supply and demand, and land use going back a minimum of 10 years.

Covered in May

Current Conditions

Holds constant the most recent or "current" data on population, land use, year type, water supply and demand, and hydrologic conditions.

Refreshing This Month

Future Conditions

Uses the future planning horizon to estimate population growth, land use changes, climate change, etc.

Covered This Month

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Current Conditions Baseline - Assumptions

- Hydrologic Period: Water Years 1968-2018 (~50-YearHydrology)
- River Flows
  - Merced: MercedSIM
  - San Joaquin: CalSim
  - Local Tributaries: Historic Records
- Land Use and Cropping Patterns: 2014 LandIQ
- Urban Water Use: 2013
- Surface Water Deliveries
  - MID
  - SWD
  - TIWD
  - Chowchilla WD

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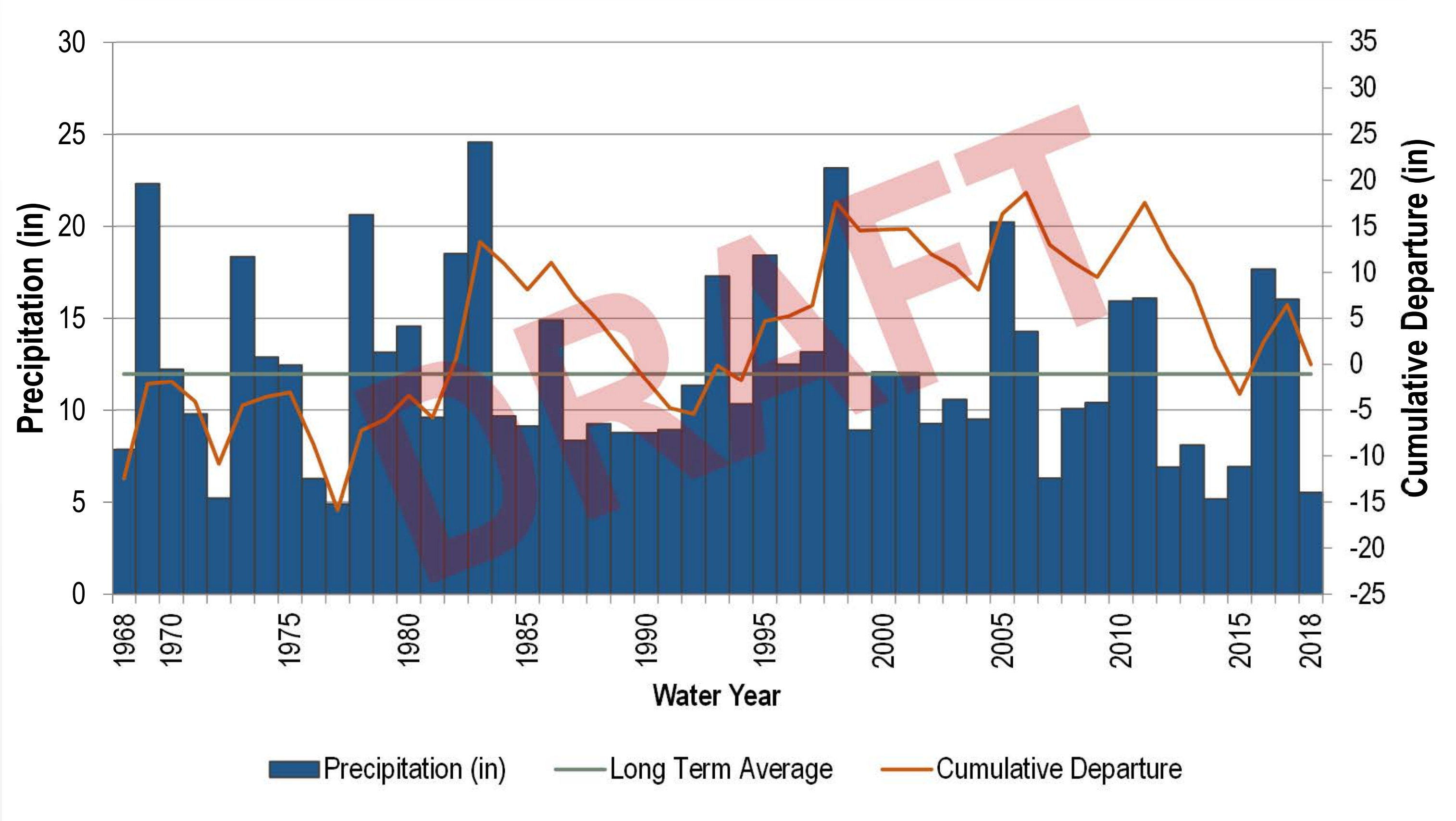
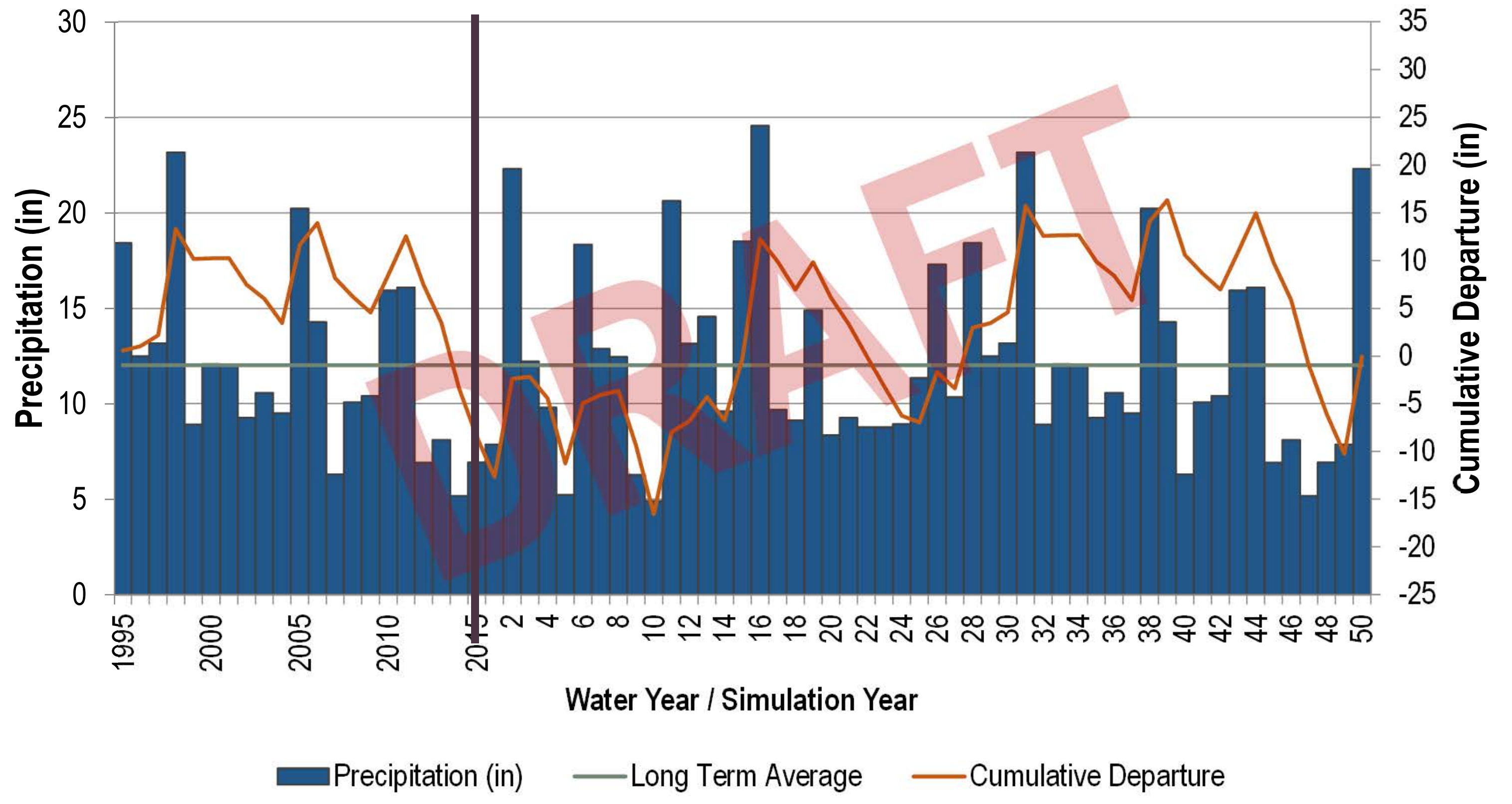
Merced WR Model Historical Hydrology



Merced WR Model Baseline Hydrology



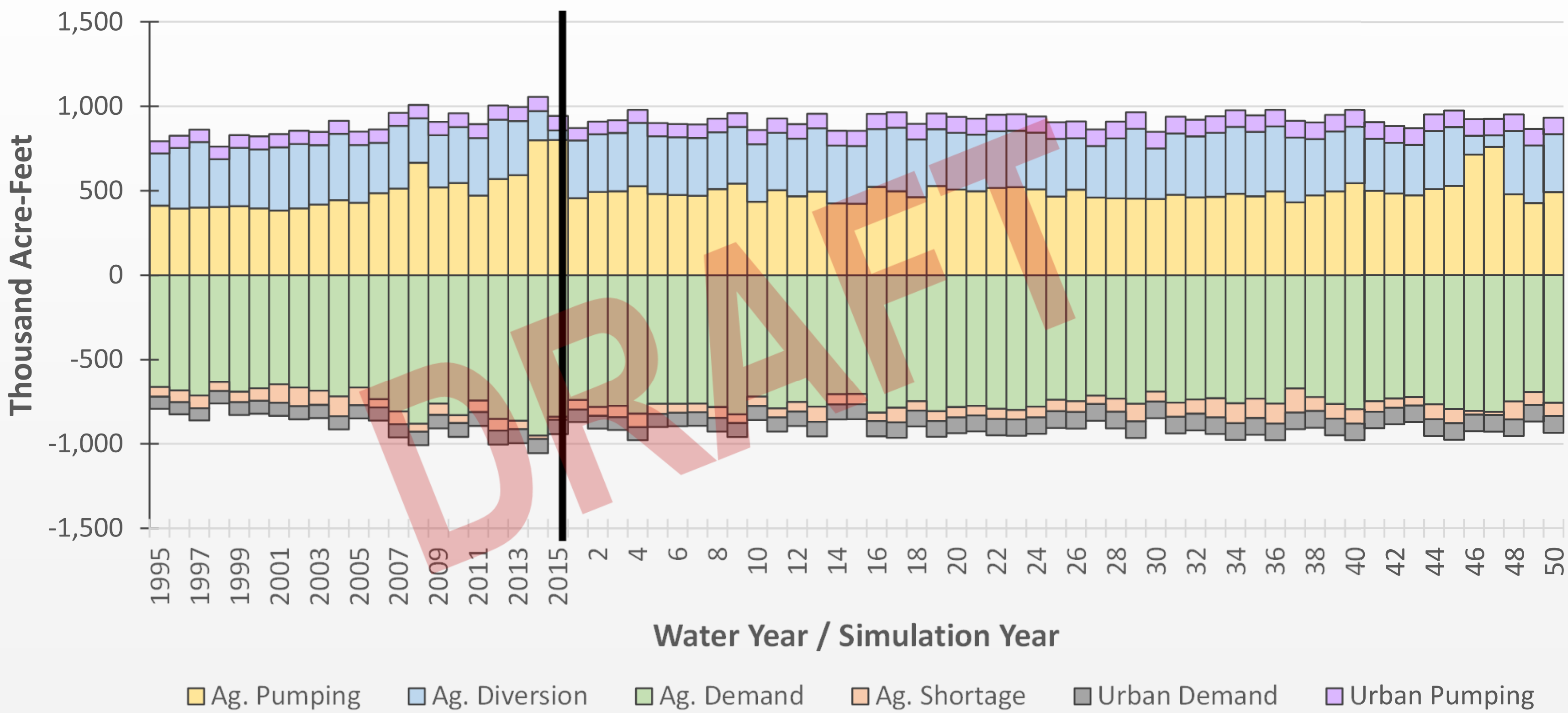
Future Conditions Baseline

- Hydrologic Period: Water Years 1968-2018 (~50-Year Hydrology)
- River Flows
  - Merced: MercedSIM
  - San Joaquin: CalSim
  - Local Tributaries: Historic Records
- Land Use and Cropping Patterns: 2014 LandIQ + Modified per local anecdotal information
- Urban Water Use: General Plan Buildout Conditions
- Surface Water Deliveries
  - MID- Merced Water Supply Plan + MID's policy of converting GW users to SW
  - SWD
  - TIWD
  - Chowchilla WD

MERCED SGMA

Projected Conditions Baseline Land & Water Use Budget

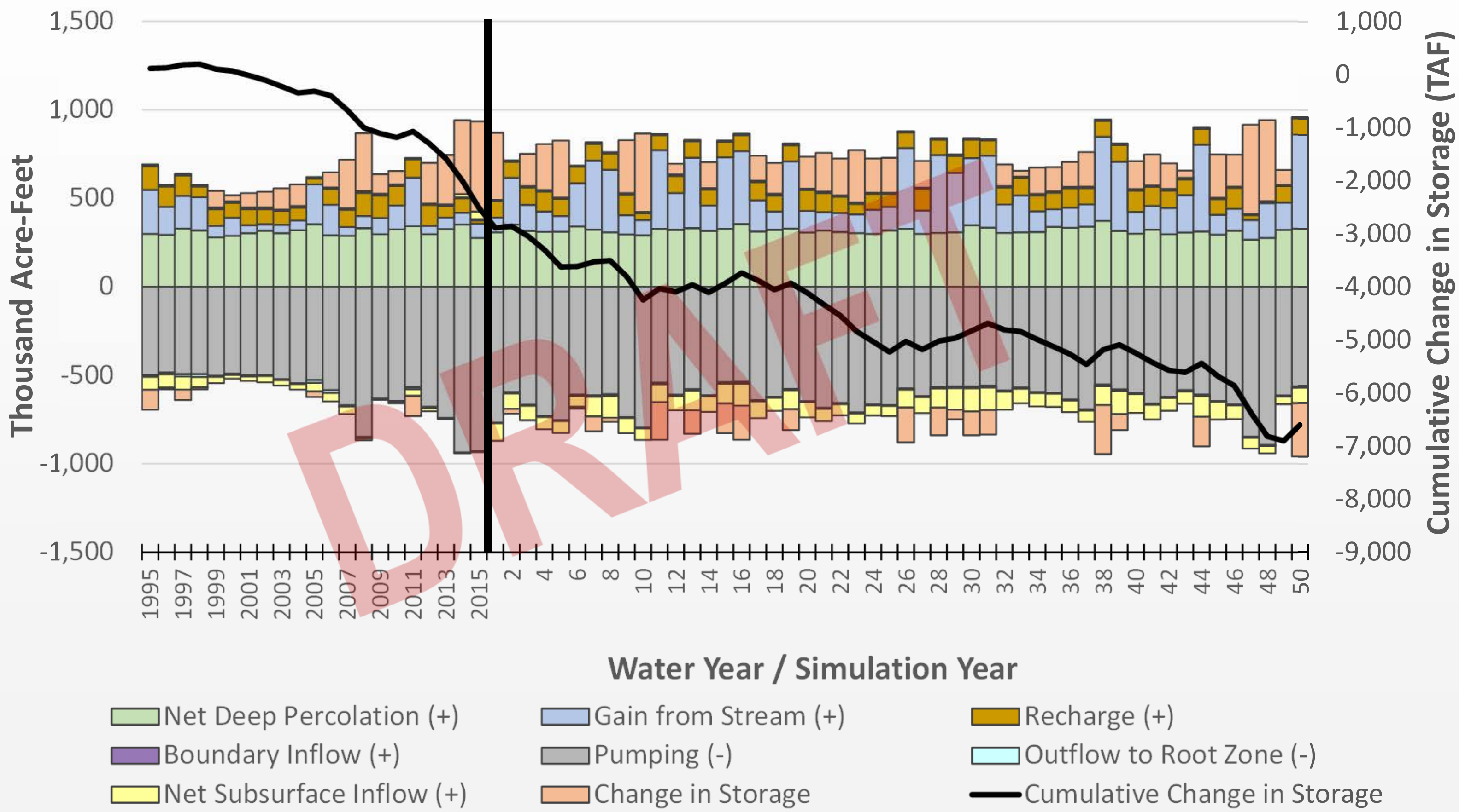
Merced Groundwater Subbasin



MERCED SGMA

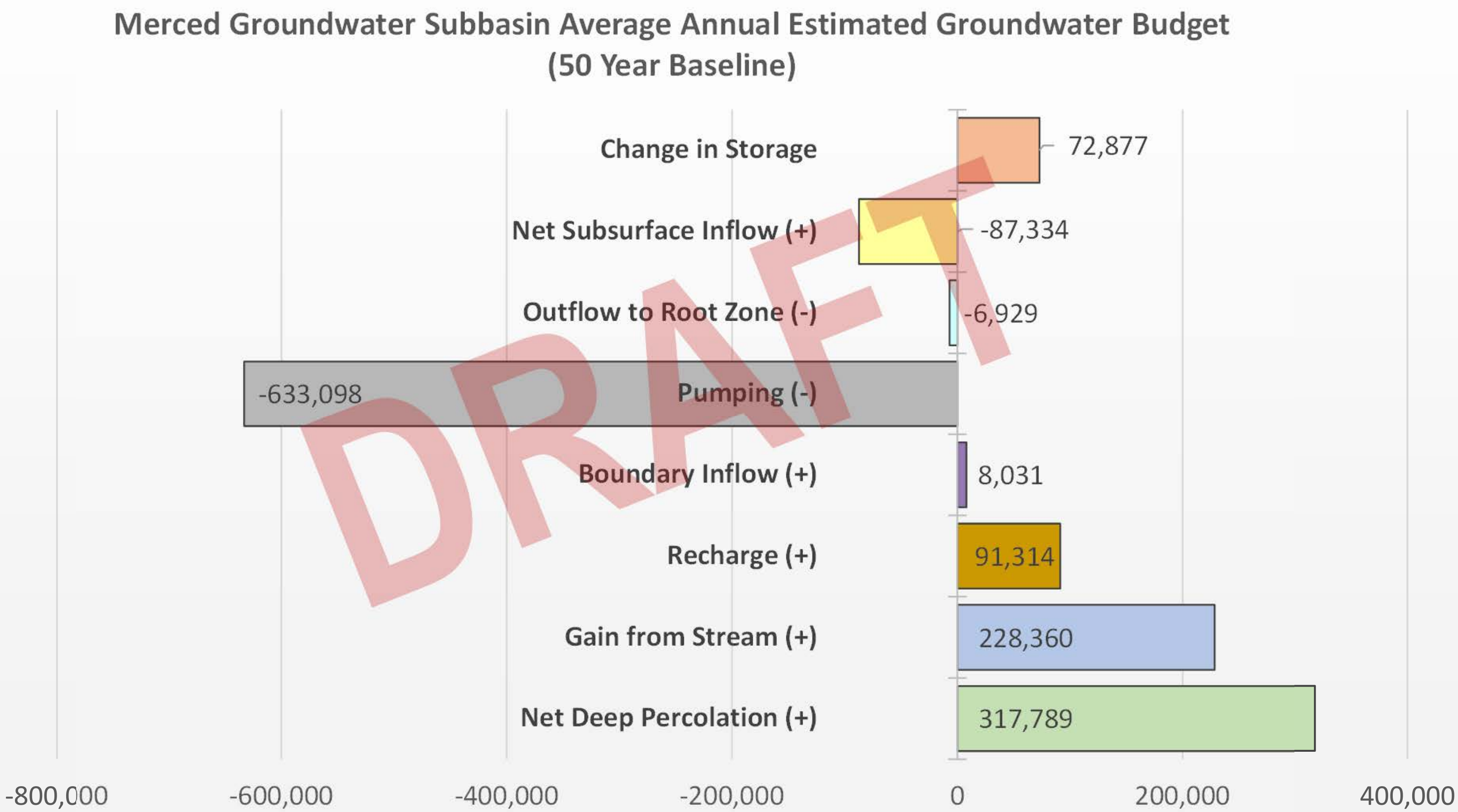
Projected Conditions Baseline Groundwater Budget

Merced Groundwater Subbasin



MERCED SGMA

Projected Conditions Water Budget



Sustainable Yield

- What is sustainable yield?
  - “the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.”
- How do we develop this?
  - Can be developed through a groundwater model scenario, modifying conditions to avoid minimum thresholds
- How do we work toward a balance?
  - Value can direct the need to increase recharge or decrease production – leading to needs for projects.

MERCED SGMA

Public Outreach Update

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA

Public Outreach Update

- Public Meeting August 2 @ 6:00 PM
  Sam Pipes Room
  Merced Civic Center
  678 W 18th Street
  Merced, CA
- You are all encouraged to attend! Please spread the word.
- Coordinating with Self Help Enterprises to reach DACs

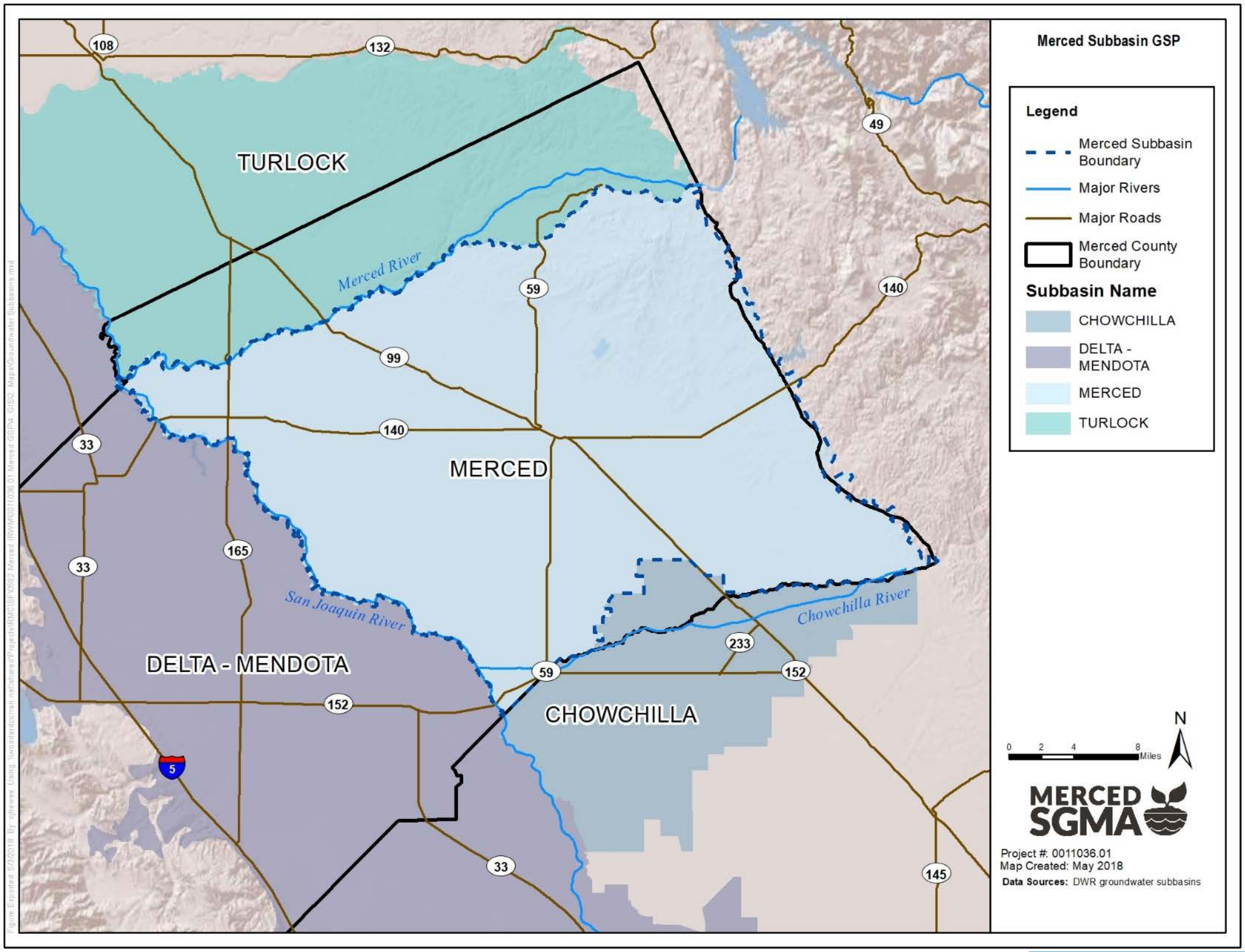
MERCED SGMA

Coordination With Neighboring Basins Update

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA

Coordination with Neighboring Basins



DWR Technical Support Services Update

Image courtesy: Veronica Adrover/UC Merced

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Questions/Comments from Public

Image courtesy: Veronica Adrover/UC Merced

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Next Steps

Image courtesy: Veronica Adrover/UC Merced

Next Steps

- Incorporate edits from Plan Area and Basin Conditions comments July/August

- Adjourn to next meeting (Monday, August 27, 2018 @ 1:30 PM, location Castle Airport)

- Focus for August meeting
  - Minimum thresholds
  - Data management
  - Revised water budgets

- August 2, 2018 Public Meeting @ Sam Pipes Meeting Room, Merced)

MERCED SGMA

GSP Coordinating Committee

Coordinating Committee Meeting – July 23, 2018

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA-1

Image courtesy: Veronica Adrover/UC Merced

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